Posttraumatic growth in accident survivors with and without PTSD and after successful PTSD treatment

Thesis
presented to the Faculty of Arts
of
the University of Zurich
for the degree of Doctor of Philosophy

by
Tanja Zöllner
from Germany

Accepted in the fall semester 2008 on the recommendation of
Prof. Dr. Verena Kast and
Prof. Dr. Dr. Andreas Maercker

2009

Für meine geliebte Oma, Martha Pfeifer,

die aufgrund von Krieg und Armut ihr intellektuelles Potential
nicht so hat zum produktiven Ausdruck bringen können,
die dafür viel Liebe und Güte auf der Erde hinterlassen hat
und die jetzt sicher furchtbar stolz auf mich wäre.

TABLE OF CONTENTS

TABLES AND FIGURES

INCLUDED PAPERS

I. Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology – a critical review and introduction of a two component model. *Clinical Psychology Review, 26,* 626 – 653.

II. Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors: Openness and optimism as predictors of ist constructive and illusory sides. *Journal of Clinical Psychology, 64,* 1 – 19.

III. Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (submitted). Posttraumatic growth as outcome of a cognitive-behavioral therapy trial for motor vehicle accident survivors with PTSD?

ACKNOWLEDGEMENTS

Zur Entstehung der vorliegenden Arbeit haben zahlreiche Menschen direkt und indirekt beigetragen. Deswegen möchte ich ganz besonders danken:

- den Studienteilnehmern und Studienteilnehmerinnen für ihr Interesse und bereitwillige Teilnahme an Befragungen und Untersuchungen zu diesem Projekt und insbesondere den Patientinnen und Patienten der Therapiestudie, die sich mit Mut, Energie und Engagement auf das doch zum Teil fordernde Unternehmen eingelassen haben.

- Prof. Dr. Dr. Andreas Maercker, meinem Doktorvater und Projektleiter, der mich die Jahre der Promotionszeit hindurch in sehr positiver und konstruktiver Weise wissenschaftlich begleitet hat, dabei mich weise gelenkt, gefordert und gefördert und an meine Fähigkeiten geglaubt hat. Und der auch in menschlicher Hinsicht mir ein sehr guter Begleiter war – sprich: ein Top-Doktorvater. Andreas, herzlichen Dank!

- Prof. Dr. Verena Kast für ihr Interesse, ihre unkomplizierte Unterstützung und ihre freundliche Bereitschaft zur Begutachtung dieser Arbeit.

- Dr. Anke Karl, der zweiten Projektleiterin, und Sirko Rabe für die gemeinsame Projektarbeit, die gegenseitige moralische Unterstützung in schwierigen Zeiten, für hilfreiche Ideen und Rückmeldungen bei der Projektplanung und ersten Manuskriptentwürfen sowie für das gemeinsame Lachen bei zahlreichen Projektbesprechungen und den Spaß bei ausgelassenen Projektabenden im Großteam.

- dem gesamten Projektteam mit HIWIS, DiplomandInnen, SupervisorInnenn, TherapeutInnen, die durch ihr jeweiliges Engagement mit zum erfolgreichen Gelingen des Forschungsprojekts beigetragen haben.

- Prof. Dr. Hans-Ulrich Wittchen und Prof. Dr. Jürgen Hoyer, die für die Durchführung des Therapieprojekts die Therapieeinrichtung der Universitätsambulanz für Klinische Psychologie und Psychotherapie der TU Dresden zur Verfügung gestellt haben.

- Dr. Susanne Hedlund (PhD), Dr. Roberto Rojas und Elgin Eckert für hilfreiche Kommentare und kluge Rückmeldungen zu den ersten Entwürfen der in der Arbeit enthaltenen Publikationen. Außerdem Danke für eure jahrelange ermutigende Begleitung und vor allem eure treue Freundschaft.

- meinen Freundinnen Dr. Sabine Manzel, Bettina Oppelt, Dr. Katharina Mehner, Georgine Edlhuber, Verena Vetter, meiner Schwester Caroline Zöllner, meinem Vater Dr. Gernot Werth und Inge Kruse für die liebevolle Begleitung und moralische Unterstützung in den ganzen Jahren und dass ihr für mich da seid.

Und last but not least:

- meiner Mutter, Christa Zöllner für ihre nicht zu bemessende jahrelange Unterstützung meiner akademischen Ausbildung und die finanzielle Hilfe bei Studium, Studien-Auslandsaufenthalten, Psychotherapieausbildung und während der Promotionszeit. Und vor allem für die beständige menschliche Anteilnahme an meinem Leben und die tatkräftige und verlässliche Unterstützung, wenn ich sie brauche. Danke, Mama!

ABBREVIATIONS

CAPS	Clinician Administered PTSD Scale
CBT	Cognitive Behavior Therapy
LOT-R	Life Orientation Test - Revised
MVA	Motor Vehicle Accident
NEO-PI-R	NEO-Personality Inventory - Revised
PTG	Posttraumatic Growth
PTGI	Posttraumatic Growth Inventory
PTSD	Posttraumatic Stress Disorder
RCT	Randomized Controlled Trial
WLC	Waiting List Control

1. INTRODUCTION

A growing body of empirical studies reveals that many trauma survivors report positive personal changes after trauma besides, or in spite of psychological distress. This phenomenon, called posttraumatic growth or personal growth, has recently gained increased attention by trauma researchers and clinicians. It is defined as the subjective experience of positive personal or psychological change reported by an individual as result of the struggle with trauma, loss, or a major life crisis. Examples of PTG are an increased appreciation of life, setting of new life priorities, greater closeness of intimate relationships, or positive spiritual change (Tedeschi & Calhoun, 1996, 2004). The term "posttraumatic growth" was introduced by Tedeschi and Calhoun (1995). It underscores the transformative or qualitative positive nature of the change that may emerge as result of the struggle with trauma and not as part of a more or less expected developmental process. Other terms that are used to describe the same phenomenon include "stress-related growth" (Park, Cohen, & Murch, 1996), "thriving" (O'Leary, Alday, & Ickovics, 1998), "adversial growth" (Linley & Joseph, 2004), or "benefit finding" (Affleck & Tennen, 1996). Here, the term posttraumatic growth (PTG) will be used throughout the text.

The idea that suffering, distress, or major loss can be sources of positive personal change is thousands of years old. The possibilities of personal growth or a radical positive change arising from the struggle with major life crises has been a prominent theme throughout human history as reflected in literature, philosophy, and religious writings. However, it is only recently that the topic has received attention by scholars in the fields of psychology, psychotherapy, psychiatry, and social work. Beginning in the second half of the 20th century, some major pioneers already addressed the possibility of personal growth after the experience of a major personal crisis (e.g. Caplan, 1963; Dohrenwend, 1978; Finkel, 1975; Frankl, 1963; Maslow, 1954; Yalom, 1980 cited in Calhoun & Tedeschi, 2006a).

It is, however, only in the past 15 to 20 years that researchers have paid systematic attention to the investigation of trauma-related personal growth. Authors like Schaefer and Moos (1992), Tedeschi and Calhoun (1995, 1996), followed by O'Leary and Ickovics (1995) and Park, Cohen, and Murch (1996) were among the first scientists who published work on that topic. Since then, the idea of posttraumatic growth has gained growing scientific importance. The emergence of 'positive psychology' has further supported a philosophical shift in recent trauma literature from a solely pathogenic to a salutogenic paradigm in which the focus is on positive, as well as negative, posttrauma changes. In spite of the wealth of the existing empirical studies and conceptual articles about the phenomenon

of PTG, there are still important questions open to further research such as the relation between PTG and psychological adaptation, the question of the clinical significance of PTG, or the cognitive processes involved in the emergence of PTG.

The research project on which the thesis is based was part of a large research project on traumatized motor vehicle accident survivors (MVAs) with and without PTSD conducted at the University of Dresden and endeavored to address the following research questions:

1. On the basis of the empirical literature on PTG, what can be stated about the relationship between PTG and psychological adjustment, especially PTSD? What is known about the cognitive processes involved in the experience of PTG?
2. Do MVA survivors with and without PTSD show differences in their experience of PTG?
3. Does a traditional cognitive behavioral therapy (CBT) program for MVA survivors with PTSD have a treatment effect on PTG?

The issues will be covered in the following chapters of this thesis. *Chapters 2 – 6* contain a theoretical overview and empirical review of the current state of research on PTG. *Chapter 2* introduces definitions and theoretical conceptualizations of PTG. *Chapter 3* presents a thorough review of the available empirical literature on the relationship between PTG and psychological adjustment and describes opposing theoretical positions of how to interpret the empirical results. In *chapter 4*, a new theoretical approach, the Janus face model of PTG (Maercker & Zoellner, 2004), attempts to explain the contradictory and ambiguous empirical findings on the relationship of PTG and psychological adjustment. As supporting evidence for the model, the chapter also presents the empirical literature on cognitive processes involved in PTG. *Chapter 5* summarizes the empirical findings and outlines future directions. *Chapter 6* shortly discusses the clinical utility of the PTG concept.

Chapter 7 displays the results of the cross-sectional study on MVA survivors without PTSD, with full and with subsyndromal PTSD. The study investigated the differences in overall posttraumatic growth and subdomains of PTG among the three diagnostic groups. Guided by the Janus face model of PTG, it also tested the prediction of PTG by a potentially illusory and a constructive factor. *Chapter 8* presents the results of a state-of-the-art CBT intervention study with MVA survivors with full or subsyndromal PTSD and its treatment effects on PTG. A concluding general discussion in *chapter 9* summarizes the implications

of the review and the newly presented empirical data with special emphasis on future research ideas for the field of PTG.

This thesis comprises three journal articles in their original form in chapters 2 - 6 (*paper 1*), 7 (*paper 2*), and 8 (*paper 3*). In order to develop the research questions fully, the two research articles show some degree of overlap with each other and necessarily with the review article. The references of all three articles have been conflated into one chapter of references (*chapter 10*). The review article and one empirical article have been published successfully, and the second empirical article is under review.

The study was conducted in cooperation with Sirko Rabe, Anke Karl (PhD), and Andreas Maercker (PhD), which is why the pronoun “we” is used throughout this thesis.

Posttraumatic growth in clinical psychology — a critical review and introduction of a two component model

Tanja Zoellner & Andreas Maercker

Clinical Psychology Review 26, 626 - 653 (2006)

ABSTRACT

Positive psychological or personal changes in the aftermath of trauma, defined as the result of the struggle with highly stressful events, have recently elicited heightened attention by trauma researchers. This article aims at summarizing the most important theoretical models and conceptualizations of posttraumatic growth (PTG) and addresses the issue of the adaptive significance of this phenomenon. It further renders a thorough empirical review of the relationship between PTG and psychological adjustment. European findings are specifically incorporated. As a conclusion, a two component cognitive model of PTG will be proposed that may explain the contradicting empirical findings in regard to the relationship between mental health and PTG. The Janus face model of PTG (Maercker & Zoellner, 2004) incorporates a constructive and an illusory aspect. On this basis, findings regarding relevant cognitive factors as predictors of PTG are summarized and evaluated. The article ends with a discussion of fruitful future research directions and how PTG can add a new perspective into trauma therapy.

Keywords: posttraumatic growth, posttraumatic stress disorder, coping, cognitive restructuring, protective illusions

"It's not that I am glad that it [traumatic accident] happened and that it [life] is the way it is, but for the first time in my life, I take time for myself and for what is important to me. I attend meditation classes now and that gives a lot to me. I also appreciate life a lot more. I am more aware of every day's pleasures and I am thankful for what I still have. I am very thankful for my husband. I can fully rely on him."

This statement by a patient with accident-related PTSD and severe bodily injuries in her right leg forcing her to give up work is an example of the potential positive changes that might also occur in the aftermath of trauma. Positive effects of struggling with traumatic events have been prominent themes throughout human history as reflected in literature and philosophy (e.g. Kierkegraard, 1983; Nietzsche, 1955). In the clinical literature as well, many authors have acknowledged the potential for growth from adversity (e.g. Caplan, 1964; Finkel, 1974; Frankl, 1961). In line with a reviving interest in beneficial psychological processes, it is only recently that the phenomenon of posttraumatic growth (PTG) has elicited the attention of clinicians and has inspired systematic research endeavors. Richardson (2002, p.307) depicts the growing interest as part of a "paradigm shift from a reductionistic, problem-oriented approach to 'nurturing strengths' as a 'prevalent theme across academic disciplines."

This article aims at giving an overview of theoretical considerations and existing theoretical models with regard to the phenomenon of posttraumatic growth. Different conceptualizations of PTG as result of the struggle with trauma or as a coping strategy will be explored. Then, important issues in concern to the meaning and adaptive significance of posttraumatic growth will be discussed. The empirical review will first focus on how growth from traumatic events relates to psychological adaptation. A critical evaluation of research results will lead to the proposition of a two-component cognitive model of self-perceived posttraumatic growth. Then, in light of this approach, a further empirical review will cover the question of cognitive predictors of PTG. The article concludes with ideas for future research and guidelines for implementing a growth perspective into clinical practice.

2. THEORETICAL STATUS OF POSTTRAUMATIC GROWTH

2.1. Definitions

Traumatic events are defined by the APA (1994) diagnostic criteria as events that involve actual or threatened death or serious injury. The response of the person who was exposed to such a traumatic event has to be one of fear, helplessness, or horror.

Posttraumatic stress disorder (PTSD) is a common psychiatric outcome after trauma. The disorder is characterized by persistent re-experience of the traumatic event in one or more of the following ways: Recurrent recollections, recurrent dreams, flashbacks, intense cue-sensitivity, or physiological reactivity. Furthermore, persistent avoidance of internal or external cues associated with the trauma in three or more of the following ways is characteristic of PTSD: Avoiding thoughts, avoiding activities, inability to recall, diminished interest, detachment, restricted affect, and sense of foreshortened future. Persistent increased arousal in two or more of the following is the third symptom cluster of PTSD: Difficulty sleeping, irritability, difficulty concentrating, hypervigilance, and exaggerated startle response. The full symptom picture must be present until at least one month after the trauma. Epidemiological studies showed, for example, an incidence of PTSD of about 55% after rape, of about 35% after childhood sexual or physical abuse, of about 17% after physical and armed assaults, and of about 7% after severe accidents (Kessler, Sonnega, Bromet, & Nelson, 1995; Maercker, Michael, Fehm, Becker & Margraf, 2004).

A growing body of empirical studies reveals that many trauma survivors also experience positive psychological changes after trauma. Posttraumatic growth is defined as the subjective experience of positive psychological change reported by an individual as result of the struggle with trauma. Examples of positive psychological change are an increased appreciation of life, setting of new life priorities, a sense of increased personal strength, identification of new possibilities, improved closeness of intimate relationships, or positive spiritual change.

People report those positive outcomes following extremely stressful situations, either as a direct result of the event or as a kind of learning that occurred through their efforts to cope with the events (see Park, 1999). Posttraumatic growth describes the experience of individuals who do not only recover from trauma, i.e. return back to pre-trauma functioning after a period of emotional distress, but use it as an opportunity for further individual development. Those individuals overcome trauma with improved psychological functioning in specific domains. Calhoun, Cann, Tedeschi, and McMillen (2000) defined the concept of

posttraumatic growth as "the experience of significant positive change arising from the struggle with a major life crisis" (p. 521). For example, a person who has managed to overcome a traumatic death of a partner might discover her personal strength through the experience of struggling with it. She may lose her fear of the future because she feels "if I could handle that, I can handle everything." Or, an individual who is confronted with having a terminal disease like cancer might experience over time a profound shift in priorities that results in a decision to spend more time with loved ones.

Different terms are used to describe posttraumatic growth. PTG has also been referred to as *finding benefits* (Affleck & Tennen, 1996), *stress-related growth* (Park, Cohen, & Murch, 1996), *thriving* (O'Leary, Alday, & Ickovics, 1998), *positive psychological changes* (Yalom & Lieberman, 1991), or *adversial growth* (Linley & Joseph, 2004). This article follows Tedeschi and Calhoun (1995; 2004) and uses the term posttraumatic growth as it best and most clearly expresses the meaning of the phenomenon: The term "posttraumatic" stresses that growth happens in the aftermath of an *extremely stressful event* (traumatic event), not as the result of any minor stress or as a part of a natural developmental process. The usage of the terms "trauma" or "traumatic event" in writings by Tedeschi and Calhoun, is a bit broader and more inclusive than the more restrictive DSM-IV (APA, 1994) criteria. For example, PTG has often been studied in people having a terminal disease like cancer or AIDS. The term "growth" underscores that the person has developed *beyond* her previous level of adaptation, psychological functioning, or life awareness. It expresses that in people's lives there is something positively new which signifies a kind of *additional* benefit compared to pre-crisis level. Those beneficial outcomes might include individual development, personal benefits, new life priorities, a deepened sense of meaning, a deepened sense of connection with others or with a higher power. "[P]osttraumatic growth refers to a change in people that goes beyond an ability to resist and not be damaged by highly stressful circumstances; it involves a movement beyond pretrauma levels of adaptation. … [I]t has a quality of transformation, or a qualitative change in functioning" (Tedeschi & Calhoun, 2004, p. 4). In this text, the term posttraumatic growth is used throughout the article, even though other authors might have used different terms to describe the phenomenon. However, even the term "posttraumatic growth" is an imprecise term for the phenomenon because the majority of the theoretical and empirical literature on PTG describes and measures the *subjective perception* of PTG. Therefore, the term "posttraumatic growth" is often a shortened version of "self-perceived posttraumatic growth."

2.2. Theoretical Conceptualizations of PTG

Different theorists have proposed diverse conceptualizations of PTG. The phenomenon has been conceptualized as an *outcome* of the struggle with a traumatic event (Schaefer & Moos, 1992, 1998; Tedeschi & Calhoun, 1995, 2004), or as a *coping strategy* (e.g. Affleck & Tennen, 1996). As an outcome of coping with trauma, posttraumatic growth denotes a significant beneficial change in cognitive and emotional life that may be the "antithesis" of posttraumatic stress disorder (PTSD). To clarify this line of thinking, it is important to underline that PTG and PTSD are distinct, independent constructs representing separate, but in either case continuous dimensions. Both concepts are not regarded as two ends of the same continuum of, for example, adaptation to trauma. PTG and traditional measures of psychological adjustment are thought to be independent, because domains of growth are conceptually distinct from general emotional adjustment. PTG is not the same as an increase in well-being or decrease in distress (Tedeschi & Calhoun, 2004). Therefore, growth and emotional distress may well coexist for some people.

2.3. Models of PTG as Outcome

In general, models of unintentional change depict change -including PTG- as a byproduct of attempts to cope with a life-changing, traumatic event. As Janoff-Bulman put it (1992, pp.138): "Not a chosen fate but some choice in coping." For example, Aldwin (1994) emphasizes the potential benefits of handling a stressful event by proposing that stress might not always be negative, but supposedly necessary for personal development. In her model of "transformational coping," she postulates that coping serves either as a homeostatic or a transformational function. The latter results in positive or negative changes. Therefore, three possible modes of coping result in three different outcomes after a stressful event. Homeostatic coping leads to a return to base line, transformational negative coping leads to a lower level of functioning, and transformational positive coping leads to a higher level of functioning (growth). Similarly, in their model of discontinuous change, O'Leary and Ickovics (1995) describe three possible outcomes following challenge: Return to the old level of functioning (recovery), to a lower level (survival), or to a higher level of functioning (thriving) (for a more detailed account of change models see O'Leary, Alday, & Ickovics, 1998). In contrast to those general models of change, the models by Schaefer and Moos (1992), and most prominent, by Tedeschi and Calhoun (1995, 2004), have been explicitly developed to illustrate the mechanisms of PTG.

2.3.1. Schaefer & Moos (1992): Model of life crises and personal growth

In their "conceptual model of positive outcomes of life crises and transitions," Schaefer and Moos (1992) outline the determinants of positive outcomes of crises: Environmental and personal system factors are supposed to shape the life crisis experience and its aftermath. They influence cognitive appraisal processes and coping responses which, in turn, affect the outcome of the crisis. All components of the model are linked by feedback loops, thus influencing one another. The personal system includes socio-demographic characteristics and personal resources such as self-efficacy, resilience, optimism, self-confidence, an easy-going disposition, motivation, health status, and prior crisis experience. Environmental factors include personal relationships, support from family, friends and social environment as well as financial resources and other aspects of the living situation. Event-related factors comprise the effects of the severity, duration, and timing of the life crisis and its scope on the individual. The authors point to the important role of approach coping for growth to occur as opposed to avoidance coping.

2.3.2. Tedeschi & Calhoun (1995, 2004): Revised model of posttraumatic growth

Tedeschi and Calhoun (2004) have recently outlined a revised version of their earlier model (1995) in which they filled in more details on how the process of growth is conceptualized. In their "functional-descriptive model of PTG," they describe PTG solely as an outcome variable. The growth process is conceptualized as follows: A traumatic event, which is an event of "seismic" proportions, shakes or destroys some key elements of a person's important goals and worldviews. It represents a challenge to higher-order goals, higher-order beliefs, and the ability to manage emotional distress. The resulting emotional distress initiates a process of recurrent rumination and attempts to engage in behavior that is designed to reduce distress. Initially, rumination is more automatic than deliberate. It is characterized by frequent returns to thinking activity regarding the trauma and related issues. After the first coping success (e.g. reduction of emotional distress, disengagement from unreachable goals), rumination transforms into more deliberate thinking about the trauma and its impact on one's life. Rumination in its constructive version of cognitive processing (analyzing the new situation, finding meaning, and re-appraisal) is assumed to play a key role in the development of personal growth. PTG is conceptualized as a multidimensional construct including changes in beliefs, goals, behaviors, and identity as well as the development of a life narrative and wisdom. As in the first conceptualization, pre-trauma

variables within the person, social support variables and some enduring distress are assumed to influence the coping process and the emergence of PTG.

Both *explicit models of PTG* (Schaefer & Moos, 1992; Tedeschi & Calhoun, 1995, 2004) are complex and inclusive models of distal and proximal predictors of PTG. For example, in Tedeschi and Calhoun's model (p.7): Posttraumatic growth is predicted by "person pre-trauma characteristics, self disclosure, fundamental schemas, beliefs and goals" (distal factors) as well as by factors of "rumination, more deliberate, schema change, narrative development" and "enduring distress" (proximal factors). With few exceptions (e.g. enduring stress), the proposed constructs are quite general, seeming to serve as place holders for more specific terms that would allow more concrete operationalizations and theoretical specifications. Due to the vague definition of some of the predictors, both models are difficult to be tested empirically. They can, however, serve as heuristic frame models guiding research questions and encourage more precise formulations of factors and theoretical predictions.

2.4. Models of PTG as Coping Strategy

PTG as a coping strategy to handle severe stress is usually embedded in general theories of coping as an adaptive response (Affleck & Tennen, 1996). Some approaches on personal growth within coping models are exemplified below.

2.4.1. PTG as one construal of meaning (Davis, Nolen-Hoeksema, & Larson, 1998)

In light of the need in Western cultures to believe that by and large the momentous events in one's live are controllable, comprehensible, and nonrandom (Heider, 1958; Kelley, 1972), the adaptive and important role of making meaning in response to loss or traumatic events has been pointed out by many theorists. Within their conceptualization of meaning making (Davis, Nolen-Hoeksema, & Larson, 1998), PTG as has been regarded as one of two possible construals of meaning. The authors pinpoint that researchers have usually given much attention to only one construal of meaning, i.e. causal attributions answering the question "why did it happen?" They consider another construal of meaning as important: Benefit attributions giving answer to the question "what for?" According to this conceptualization, the subjective perception of personal growth would signify a benefit attribution (for similar views see also Janoff-Bulman & Frantz, 1997).

2.4.2. PTG within a meaning-making coping process (Park & Folkman, 1997)

In their conceptualization of meaning in the context of stress and coping, Park and Folkman (1997) distinguish between situational and global meaning. Global meaning encompasses a person's enduring beliefs and valued goals. Situational meaning, in contrast, is the meaning that is formed in the interaction between a person's global meaning and the circumstances of a particular person - environment interaction. A traumatic event threatens global meaning, thereby initiating the meaning-making process. It is the challenge of the coping process to integrate situational meaning (appraisal of the trauma) with global meaning. Within this framework, different areas of posttraumatic growth would fall into different categories of meaning making: Finding benefits from the traumatic event (such as personal strength) would fall into the category of assimilation, i.e. changing the situational meaning to accommodate the global meaning. In contrast, a modified philosophy of life would address enduring changes in global meaning.

2.4.3. PTG as an interpretative process (Filipp, 1999)

Filipp (1999) regards PTG as an interpretative process that she embeds in an information-processing view of coping: She assumes that people being confronted with loss and trauma pass through three processes in their coping efforts. At first, "perceptive reality" is construed by attentive and comparative processes. Attentive processes include the defense of positive illusions, self-enhancing illusions, and hope. Comparative processes designate palliative comparisons by performing social and temporal comparisons. The stage of "perceptive reality" is followed by the stage of "interpretative reality" which evolves as the result of ruminative thinking, finding explanations for the questions "what happened?" and "why?" Within this conceputalization, PTG is one possibility to construct "interpretative reality."

2.4.4. PTG as one form of self-enhancing appraisal or positive illusion (Taylor, 1983)

Taylor (1983) has made positive appraisals the centerpiece of her theory of cognitive adaptation to threatening events. In her formulation of the cognitive adaptation to threat, Taylor (e.g. Taylor & Armor, 1996) regards PTG as a form of "positive illusion" with an adaptive function for psychological adjustment. The perception of PTG is one possible self-enhancing appraisal that helps to cope with threat.

The presentation of different concepts for the phenomenon of PTG has artificially opposed PTG as a coping strategy to PTG as an outcome of coping. However, many theorists acknowledge that posttraumatic growth can be both, coping style and coping outcome, and that these two modes can include differentially adaptive proportions (e.g. Affleck & Tennen, 1996; Calhoun & Tedeschi, 2004; Maercker & Zoellner, 2004). Having given an overview of different models and conceptualizations of posttraumatic growth, we will turn to the question of the adaptive significance of PTG.

3. PTG AND ITS RELATIONSHIP TO MENTAL HEALTH

Within this review, the relationship between PTG and mental health is significant for the following reason: If posttraumatic growth is a phenomenon worthy to be studied in clinical research, it is assumed to make a difference in people's lives by affecting levels of distress, well-being, or other areas of mental health. If it does not have any impact, then, PTG might just be an interesting phenomenon possibly belonging to the areas of social, cognitive, or personality psychology. Curiously, many authors, regardless of their adopted conceptualization of PTG, have accepted the notion of the *adaptive significance* of PTG. However, clear evidence for this hypothesis is still lacking. In the following, we will try to give a brief, but balanced overview of empirical findings on the relationship of PTG with PTSD, depression and other adjustment outcomes without claiming to give a complete review (for other reviews see Affleck & Tennen, 1996; Park & Folkman, 1997; Taylor & Armor, 1996). Before doing so, we will give a brief summary of the measurement of PTG.

3.1. Assessment of PTG

Researchers have attempted to capture the phenomenon of PTG by using qualitative and quantitative methodologies. Many empirical studies used an interview format to assess PTG. Usually, interviews targeted positive life changes or benefits resulting from x (the traumatic event) in an open-ended question format, such as, "have there been any benefits that resulted from your experience of x? Please, describe your experience" (e.g. Davis et al., 1998). Often, positive and negative life changes were assessed simultaneously. Typically, participants´ responses were categorized into the domains of PTG by post-hoc analyses. In the statistical analyses, authors usually evaluated, whether or not there had been any benefit at all and, in a separate analysis, rated the number of reported benefits. Several researchers used scales newly developed for the purpose of their study, such as a measure of positive

and negative life changes (Klauer & Fillip, 1997) or the 17-item Life Change Measure (Frazier, Conlon, & Glaser, 2001). Several instruments have been developed as measures of growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) contains 21 items forming subscales that assess growth across the dimensions of relating to others, new possibilities, personal strength, appreciation of life, and spiritual change. The Stress-Related Growth Scale (SRGS; Park et al., 1996) is a 50-item measure, with various test results suggesting a single-factor interpretation of growth. The Changes in Outlook Questionnaire (CiOQ; Joseph, Williams, & Yule, 1993) is a 26-item measure of positive and negative changes. The Perceived Benefit Scales (PBS; McMillen & Fisher, 1998) consist of 30 positive change items and 8 negative change items. Among the instruments mentioned above, only the PTGI and the SRGS represent standardized and validated questionnaires (for further information on PTG assessment see Cohen, Hetter, & Pane, 1998).

3.2. PTG and PTSD

Most cross-sectional studies investigating the relationship between posttraumatic growth and symptoms of posttraumatic stress disorder did not find any systematic relationship between the two. The correlation coefficients between the measures for those concepts ranged from r = -.2 to r = .2 in samples of former East-German political prisoners (Maercker, 1998), former victims of the Dresden bombing night (Maercker, Herrle, & Grimm, 1999), former refugees and displaced people form Sarajevo (Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003), and spinal cord injury individuals (Znoj, 1999) (see Table 3.1).

In two studies, a significant positive association between PTG and PTSD emerged: Within the studies that were designed to develop the Stress-Related-Growth Scale (SRGS) (Park et al., 1996), posttraumatic growth was significantly positively correlated with PTSD symptoms in two large samples of college students with an average correlation coefficient of r = .25* (see Table 3.1). A similar finding was reported by Schorr and Roemer (2002): They found low to moderate positive associations (r = .25**) between posttraumatic growth and PTSD symptoms (see Table 3.1). The largest negative relationship between PTG and PTSD was found in a sample of sexual assault survivors (Frazier et al., 2001), with a significant cross-sectional correlation between a life change measure and PTSD symptoms (r = -.38***). In the same study, an analysis of variance with four “benefit”-groups and two assessment times (2 weeks and 12 months post-assault) revealed that those who gained positive changes from first to second assessment or always had positive changes suffered

from fewer PTSD symptoms compared to women who had lost benefits or never had benefits (see Table 3.1). In a longitudinal study by McMillen, Smith, and Fisher (1997) who interviewed survivors of three types of disaster 4-6 weeks after the incident and 3 years later, reports of posttraumatic growth at time 1 were predictive of fewer PTSD symptoms at time 2. PTG was, however, not predictive of a change in diagnosis from time 1 to time 2. However, in a comparison of a "benefit"- versus "no-benefit" group, an interaction effect of the severity of exposure and perceived benefit on number of psychiatric diagnoses change emerged. For survivors who reported benefits, the number of diagnoses decreased with increased severity of disaster exposure, whereas for those who did not indicate any benefits, the number of diagnoses increased with increased severity of disaster exposure (see Table 3.1). These findings may point to a buffering effect of the perception of personal growth in the face of more *severe* traumatic exposure.

Taken together, both longitudinal studies found that PTG at first assessment predicted fewer PTSD symptoms at second assessment. Most cross-sectional studies did not find a significant relationship between PTG and PTSD. Interestingly, those studies that employed standardized measures of PTG (either the SRGS or the PTGI) did find either no or a positive association between PTG and PTSD. Those studies that found a negative association between growth and PTSD either used interview format or self-constructed scales to assess PTG.

3.3. PTG and Depression

Most studies investigating the relationship between posttraumatic growth and depressive symptoms found no systematic relationship between the two cross-sectionally. This null finding emerged in bone marrow transplantation patients (Curbow, Somerfield, Baker, Wingard, & Legro, 1993), accident survivors (Joseph et al., 1993), college alumni (Aldwin, Levenson, & Spiro III, 1994), MS patients (Mohr et al., 1999), bereaved parents and spinal cord injury patients (Znoj, 1999) and breast cancer survivors (Cordova, Cunningham, Carlson, & Andrykowsky, 2001) (see Table 3.2). The mean correlation coefficients between depression as measured by standardized depression scales and PTG ranged from r = -.1 to r = .1. In the large sample of over 1,000 male veterans, depression was negatively correlated with PTG (r = -.1**). In the longitudinal study by Frazier et al. (2001) who assessed sexual assault survivors 2 weeks and 12 months post-assault, depression and PTG were significantly negatively correlated cross-sectionally, with an average effect size of r = -.5**. Furthermore, those individuals who gained positive changes

Table 3.1. *Posttraumatic Growth and PTSD*

Authors	Sample	*n*	Measure of posttraumatic growth	Measures of PTSD symptoms	Results Relationship between growth and PTSD	Categorical relationship PTG-adjustment
Cross-sectional studies						
Aldwin et al. (1994)	Male veterans (40% in combat)	1.287	28-item scale for un/desirable effects of military service	MSCR-PTSD	r = -.10**	+
Park et al. (1996)	1. College students	500	SRGS	IES-R	r = .31***	–
	2. College students	250	SRGS	IES-R	r = .21**	–
Snape (1997)	Persons having been admitted to hospital after accident or assault	53	PTGI	IES	r = .48* at 2 months post-incident r = .46* 4 months post-incident	– –
Maercker (1998)	Former East-German political prisoners	124	SRGS (German version)	IES-R	r = -.23 – r = .13; n.s.	O
Maercker et al. (1999)	Former victims of Dresden bombing	47	SRGS (German version)	IES-R	r = .06 – r = .13; n.s.	O
Znoj (1999)	bereaved parents	176	SRGS	IES-R	r = -.11; n.s.	O
	spinal cord injured persons	273	SRGS	IES-R	not specified	O
Cordova et al. (2001)	Breast cancer survivors	70	PTGI	IES-R	r = -.1 - r = -.2; n.s.	O
Frazier et al. (2001) [Cross-sectional part]	Sexual assault survivors	Ca. 90	17-item life change measure	17-item PTSD	r = -.38*** 2 weeks post-assault r = -.09; n.s. 12 months post-assault	+ O
Schorr and Roemer (2002)	College students	140	PTGI	PTSD Checklist	r = .25**	–
Powell et al. (2003)	Former refugees and displaced people from Sarajevo, Bosnia.	131	PTGI	PDS	r = .001; n.s.	O
Longitudinal studies						
McMillen et al. (1997) 4-6 weeks after incident (T1) three years later (T2)	3 types of disaster: tornado, mass killing, plane crash	195	Open-ended benefit question	DIS: PTSD diagnosis diagnosis change	Benefit finding at T1 predicted less PTSD symptoms at t2 (OR = 0.28, p <.05), but did not predict diagnosis change.	+
Frazier et al. (2001) 2 weeks post-assault (T1)	Sexual assault survivors	171	17-item life change measure	17-item PTSD	Significant group differences among 4 "benefit" groups (benefits at T1 and T2; gained benefits from T1 to T2; never had benefits or lost benefits) in regard to levels of PTSD symptoms (F = 3.20,	+

12 months post-assault (T2)		p <.05) at 12-months. People who always had positive changes showed less PTSD-symptoms compared to people who lost benefits or never had benefits, but also compared to people who gained positive changes.

GHQ = General Health Questionnaire; SCL-90 = Symptom Checklist 90; MSCR-PTSD = Mississippi Scale for Combat-Related PTSD; SRGS = Stress-Related Growth Inventory; IES-R = Impact of Event Scale-Revised; BSI = Brief Symptom Inventory; PTGI = Posttraumatic Growth Inventory; PDS = Posttraumatic Diagnostic Scale; DIS = Diagnostic Interview Schedule; *p < .05; **p < .01; ***p < .001.

Table 3.2. *Posttraumatic Growth and Depression*

Authors	Sample	*n*	Measure of posttraumatic growth	Measures of depression	Results Relationship between growth and depression	Categorical relationship PTG-adjustment
Curbow et al. (1993)	Survivors of bone marrow transplantation	135	Interview on positive and negative life changes	Abbreviated Profile of Mood States – depression	Correlations n.s.	O
Joseph et al. (1993)	Accident survivors	35	Self-report scale on positive changes following accident	GHQ-Depression	Correlations n.s.	O
Aldwin et al. (1994)	Male veterans (40% in combat)	1.287	28-item scale for un/desirable effects of military service	CES-Depression	r = -.10**	+
Aldwin et al. (1996)	University-alumni Trauma = low point	941	number of possible advantages	CES-Depression	r = -.02; n.s. (within proposed model)	O
Mohr et al. (1999)	Patients with MS (Multiple sclerosis)	50	Constructed questionnaire of Psychosocial Ramifications of MS (Factor 2 = Benefit finding)	POMS-Depression	r = .16; n.s.	O
Znoj (1999)	Bereaved parents	176	SRGS	BDI	r = -.10; n.s.	O
Cordova et al. (2001)	Breast cancer survivors	70	PTGI	CES-Depression	r = -.09; n.s.	O
Frazier et al. (2001) Cross-sectional study	Sexual assault survivors	ca. 90	17-item life change measure	BSI-Depression	r = -.50*** 2 weeks post-assault r = -.35*** 12 months post-assault	+ +
Longitudinal study 2 weeks post-assault (t1) 12 months post-assault (t2)	Sexual assault survivors	171	17-item life change measure	BSI-Depression	When sample was divided into 4 “benefit” groups (benefits at T1 and T2; gained benefits from T1 to T2; never had benefits or lost benefits from T1 to T2) significant group differences emerged in regard to levels of depression (F = 4.51, p < .01) at 12-months-distress. People who gained positive change or always had positive change were less depressed 12 months post-assault compared to people who lost benefits or never had benefits.	+

GHQ = General Health Questionnaire; CES = Center for Epidemiologic Studies; SRGS = Stress-Related Growth Inventory; IES-R = Impact of Event Scale-Revised; POMS = Profile of Mood States; BDI = Beck Depression Inventory; BSI: Brief Symptom Inventory; PTGI = Posttraumatic Growth Inventory; PDS = Posttraumatic Diagnostic Scale; RA: Regression Analysis; **p < .01; ***p < .001.

from time 1 to time 2, or who always had experienced benefits, were significantly less depressed 12 months post-assault (see Table 3.2). Not a single study found a positive association between PTG and depression.

3.4. PTG and Other Outcomes

PTG and its relationship to diverse measures of distress was investigated in studies assessing general distress (e.g. using the Symptom Checklist-90, SCL-90, Derogatis (1977), general affect, or specific symptoms of anxiety, anger, avoidance or hopelessness. Other studies examined the relationship between PTG and other health-inducing constructs like self-esteem, meaningfulness in life, or the belief in a benevolent world. Results of those studies are inconclusive. Most cross-sectional studies looking at PTG and general distress variables did not reveal any consistent relationship between the two measures (Joseph et al., 1993; Klauer & Filipp, 1997; Lehman et al., 1993; Maercker et al., 1999) with the exception of Mohr et al. (1999) who found a small, but significant positive correlation between benefit finding and symptoms of anxiety and anger (r = .21*). In regard to PTG and indices of positive adjustment, studies also revealed mixed results. For example, in a sample of sexually abused women, those who reported a high number of benefits from their traumatic event were higher in self-esteem, lower in relationship anxiety and experienced more comfort depending on others when compared to women who indicated not having any benefits. There were no differences, however, between the two groups in regard to comfort with closeness or the perception of the world as benevolent (McMillen, Zuravain, & Rideout, 1995) (see Table 3.3). In contrast, Klauer and Filipp (1997) did not find a relationship between the perception of positive changes and self-esteem. In a sample of stroke victims, the perception of benefit was significantly associated with less depression and greater meaningfulness in life (measured as composite adjustment scale; r = .5*; Thompson, 1991).

In a prospective study by Davis et al. (1998), individuals coping with the loss of a family member were assessed at four time points over a period of about 20 months. Finding benefits prospectively predicted lower levels of a composite distress measure incorporating depression, anxiety, and PTSD symptoms several months later, with the statistical association growing stronger over time (see Table 3.3). Furthermore, when the sample was divided into four groups a remarkable interaction effect emerged. For those who always had experienced benefits and those who had gained benefits a decrease of distress over time was evident, whereas the opposite was true for the other two groups. For those who had lost

Table 3.3. *Posttraumatic Growth and Other Adjustment Outcome Measures*

Authors	Sample	*n*	Measure of posttraumatic growth	Measures of psychological distress/adjustment	Results Relationship between growth and distress	Categorical relationship PTG-adjustment
Thompson (1991)	Stroke victims 9 months post-stroke	40	Open-ended question of perceived benefit	Composite adjustment score from depression and meaningfulness in life scales	r = .50 RA: b = .24; Final R = .70 controlling for other factors	+
Joseph et al. (1993)	Accident survivors	35	Self-report scale on positive changes following accident	GHQ-Anxiety	Correlations n.s.	O
Lehman et al. (1993)	Bereaved spouses and parents (4-7 years after death)	94	Open-ended questions of life changes (interview): positive life changes	SCL-90-R Braedburn Affects Balance Scale	r = .02; n.s. r = -.07; n.s.	O O
McMillen et al. (1995).	Sexually abused (as child) low-income women	154	Interview on perceived benefits; ratings were coded in 3 categories (no, little, quite)	Rosenberg Self Esteem-Scale Relationship anxiety Comfort depending on others Comfort closeness Benevolent world	RA with factor "much vs no benefit": 3.49** (beta) -.337**(beta) 2.72**(beta) 1.12 (beta); n.s. 1.76 (beta); n.s.	 + + + O O
Klauer and Fillip (1997)	Cancer patients	100	"Changometer" of positive and negative life changes	Hopelessness Self-esteem	Reporting positive changes as a result of coping with cancer was unrelated to measures of adjustment.	O
Maercker (1998)	Former East-German political prisoners	124	SRGS (German version)	SCL-90-R	r = -.19 – r = .08; n.s.	O
Mohr et al. (1999)	patients with MS (Multiple sclerosis)	50	Constructed questionnaire of Psychosocial Ramifications of MS (Factor 2 = Benefit finding)	POMS: --anxiety --anger	 r = .21* r = .21*	 – –
Best et al. (2001)	Parents of children treated for leukemia	113	PTGI	Pediatric Anxiety and Avoidance Scale (PAAS)	In RA, PTG was a significant individual predictor of anxiety and avoidance symptoms in mothers (ΔR^2=.25, β = .38***) and fathers (ΔR^2 = .33, β = .55***)	–

Longitudinal studies

Tennen et al. (1992)	Rheumatoid arthritis experiencing joint pain		5-item-benefit appraisal questionnaire at t1	POMS-daily mood Daily activity limitations Both were assessed daily on 75 consecutive days	Benefit appraisal was unrelated to daily mood (adjustment measure) when dispositional optimism was controlled for. Independent from optimism, however, was the association between benefit finding and daily activity limitations: Among those with severe pain, growth appraisals predicted fewer activity limitation days.	O +
Davis et al. (1998) 6 weeks pre-loss 6 months (13 months) [18 months] post-loss	People coping with loss of family member	205	Interview on benefit finding	Composite measure of distress (Symptoms of Depression, Anxiety, PTSD)	Benefit finding at T1 predicted distress levels at T2 (β = -.11, p < .05) and T3 (β = -.14, p <.05). Benefit finding at 13 months post-loss (T3) significantly predicted lower distress at T3 (β = -.18, p < .01) and at T4 (β = -.26, p < .01). The association between benefit finding and later lower distress grew stronger over time.	+
Sears et al. (2003) Directly after treatment (T1) 3 months posttreatment (T2) 12 months posttreatment (T3)	Breast cancer patients after medical treatment completion	58 (T3)	PTGI	POMS-distress (anger, depression, tension, fatigue, confusion) Perceived health score POMS-vigor (= positive mood)	Correlations between PTGI at 12 months and 12-months distress (r =-.04; n.s.) and perceived health scores (r = -.09; n.s.) not significant. Significant correlation was found between more PTG and higher positive mood (r = .32**; p = .01). Hierarchical RA revealed that controlling for positive mood at study entry, the PTGI significantly added to the prediction of 12-months POMS-Vigor (ΔR^2 = .07, ΔF (1,55) = 8.83**, partial r =.37).	O + +

RA = Regression Analysis; GHQ = General Health Questionnaire; SCL-90 = Symptom Checklist 90; SRGS = Stress-Related Growth Inventory; POMS: Profile of Mood States; PTGI = Posttraumatic Growth Inventory; PAAS = Pediatric Anxiety and Avoidance Scale (15 items derived from the Impact of Traumatic Stressors Interview Schedule);
*p < .05; **p < .01; ***p < .001

benefits and for those who never had experienced any benefits, the level of distress increased over time (see Table 3.3). Similarly, in a study of individuals with rheumatoid arthritis with severe joint pain and stiffness, fatigue, and immobility the appraisal of benefit was not related to psychological adjustment in terms of daily mood in general (Tennen, Affleck, Urrows, Higgins, & Mendola, 1992). But an interaction effect pointed to a buffering effect of benefit-finding in the face of severe distress in terms of activity limitation days: Among those with little pain, the benefit appraisal was unrelated to the number of activity limitation days. However, among those with relatively severe pain, benefit-finding predicted fewer activity limitation days (see Table 3.3).

3.5. Discussion of Empirical Findings

The short summary of empirical studies on the relationship between PTG and PTSD, depression and other adjustment outcomes reveals a rather irritating and inconclusive picture in terms of the adaptive significance of PTG. Numerous studies did not find any relevant relationship between PTG and psychological distress or adjustment variables. This null finding does not seem to depend on the nature of the sample, the nature or severity of the traumatic event, or the methods used to measure posttraumatic growth and psychological adjustment, because the studies vary greatly from one another in regard to those aspects. Overall, there seems to be no systematic relationship between PTG and PTSD symptoms or unspecific measures of distress in cross-sectional studies. In most cases, PTG and PTSD seemed to be unrelated, or, if related, then there was a positive relationship between the two. In contrast, depressive symptoms never showed a positive association with PTG. Depression was either unrelated or negatively related with the perception of personal growth. This observation makes sense: A depressed mood is usually accompanied by negative thinking, making the perception of any positive aspects of a situation less likely. The few longitudinal studies found that PTG predicted future reductions of distress or showed a buffering effect of PTG in cases of high trauma exposure. Those results point to the potential adaptive significance of PTG.

On the one hand one could argue that the existing empirical results provide preliminary evidence for the adaptive value of PTG. One the other hand, looking at the same results, one could also argue for the absence of an adaptive significance of PTG. And in fact, different authors have come to contradicting conclusions in their reviews of the empirical literature on PTG and adjustment. For example, Affleck and Tennen (1996, p. 904) state: “In summary, research on the adaptive correlates of benefit-finding among individuals facing

serious medical problems is beginning to document its unique ability to predict emotional well-being." In contrast, Filipp (1999, pp.72-73) warns that "the current state of research indicates that attempts aimed at construing benefits from loss and trauma or at finding meaning by reframing losses as gains seem to be highly limited with regard to their adaptive value."

3.6. Study Limitations and Problems of Study Comparability

There are several limitations making it difficult to interpret the results or to compare across studies: First, studies typically want to show that PTG fosters psychological adjustment. However, the instruments usually used are instruments of psychological distress or specific diagnostic instruments. It is open to discussion, whether or not psychological adjustment should be considered the absence of psychological distress. Second, PTG is measured very differently: Some studies relied on interviews while others employed more or less validated PTG instruments. When an interview form was used, the problem of defining what counts as "positive" or "growth" emerges (for this issue see also Park, 1999). Third, the studied traumata vary widely. Some of them constitute sudden, relatively short-term traumatic events (such as an air plane crash), others are long-term stressors such as the foreseeable death of a loved one. It is quite probable that the adaptation processes to these different kinds of traumatic events differ from one another and that the perception of benefits or growth may play a different role for different kinds of traumata. The studies also vary in terms of severity of the investigated traumatic incident. As Powell et al. (2003) pointed out in their overview of differing severities of traumata, there seems to be an inverted U-relationship between the severity of trauma and the perception of posttraumatic growth, with medium stress producing the highest growth. However, there are exceptions to this observation: Snape (1997) compared trauma severity and the extent of PTG in people admitted to a hospital following an accident or assault with Tedeschi and Calhoun's (1996) undergraduate sample reporting on a selected stressful life event. The author reports that higher trauma severity – but probably of medium intensity - produces lower overall PTGI scores. Fourth, another fundamental problem is that researchers usually want to make statements on PTG in general, but what they measure is *self-perceived* PTG. One can suppose that the predictors of self-perceived PTG and its adaptational role are different from the predictors and adaptive significance of an assumed "true" or objective PTG. A general problem connected with assessing PTG in the studies under review is the difficulty to know how significant exactly the designated positive changes are in the lives of the study

participants. One can assume that this also varies among individuals. For some, the simple identification of benefits does not result in any changes in daily life whereas for others, the perception of benefits influences daily life experiences greatly. One can further assume that the different meanings and implications of benefit appraisals differently affect psychological adjustment. Sears, Stanton, and Danoff-Burg (2003) report an interesting result pointing into that direction. They showed that the simple identification of benefits from the experience of having cancer did not sufficiently influence adjustment. But the effortful and regular use of benefit information was a predictor of future positive mood and perceived health. As mentioned above, the reviewed empirical studies could be regarded as evidence for the adaptive significance of PTG as well as for the absence of the adaptive value of PTG. The next section presents arguments for both positions.

3.7. Arguments for the Adaptive Significance of PTG

Notably, all longitudinal studies find (mild) positive relations between perceived growth and adjustment. Mixed results and negative results are mainly cross-sectional. This may point to a curvilinear or at least non-linear relation between PTG and adjustment. The typical null findings in regard to the cross-sectional relationship between PTG and adjustment could be explained by the assumption that the adaptive value of PTG shows its effect in the long run and can only be discovered over a period of time. In a study that assesses PTG at just one point in time, the particular stage of the post-traumatic coping process cannot also be taken into account for each study participant. Probably, different participants within a sample are at different points in their coping process. For some of them, the perception of PTG represents a form of coping effort (similar to Affleck & Tennen's "benefit reminding") in the face of enduring distress, whereas for others, the perception of PTG is a sign of coping success. Taken together, these differing stages within the coping process produce an overall non-linear relationship between PTG and psychological adjustment. Another argument for this view is that in the longitudinal studies (Davis et al., 1998; Frazier et al., 2001; McMillen et al., 1997) as well as in some cross-sectional studies (Aldwin et al., 1994) there were some interesting interaction effects with time or trauma severity providing preliminary evidence for a buffering or moderator effect of PTG on psychological adjustment. Usually those interaction effects showed that for people who perceive benefits from traumatic events, psychological distress decreases over time, while for those without benefits, psychological distress increases over time. Moreover, negative correlations between PTG and adjustment were often found in college student

samples reporting about a recent "low point" as "traumatic" event. As consequence, the nature and severity of the stressful event showed a wide variability within these nonclinical samples, ranging from something as common as difficulties with parents/boy-friend to the loss of a family member. Therefore, the negative correlation between perceived PTG and adjustment might just be a sign that those who indicated growth had experienced a more severe traumatic event with the typical initial psychological distress.

3.8. Arguments Against an Adaptive View of PTG

Several studies found significant negative relationships between posttraumatic growth and adjustment measures or significant positive relationships between PTG and psychological distress. When applying the usual logic of psychopathology research to the negative associations between PTG and psychological adjustment, one could also conclude that the perception of PTG constitutes a dysfunctional coping strategy: A positive association between dysfunctional coping strategies (e.g. rumination in the sense of Ehlers and Steil (1995) as avoidant cognitive strategy) and PTSD-symptoms is usually interpreted to mean that dysfunctional coping strategies predict distress. Applying the same kind of logic, the positive correlation of PTG and distress might also point to some kind of maladaptive cognitive process being involved in self-perceived PTG. Thus, one could also conclude that the perception of PTG itself constitutes a dysfunctional coping strategy. Remarkably, researchers usually put forth the following argument to deal with these counterintuitive empirical findings: They point out that PTG and psychological distress are different concepts unrelated to one another or that PTG might be related to some aspects of well-being (e.g. Calhoun & Tedeschi, 1998). The reasoning of a possible maladaptive role of PTG might be counterintuitive, but – on the empirical basis - is not less justified than the notion that the two concepts might be unrelated to one another. Moreover, positive findings between the relation of PTG and adjustment are usually only found in studies with non-standardized assessments of PTG, thus using procedures with low reliability and validity. Studies that used validated instruments like the PTGI or the SRGS usually did not find any systematic relationship of that kind. A confounding factor is, however, their cross-sectional design that might also contribute to the nonsystematic relationship.

But even the positive associations between PTG and adjustment in longitudinal studies do not necessarily point to the adaptive significance of PTG. It might be that a third variable is responsible for the association. As Davis et al. (1998, p. 563) state: "Though supporting data are frequently interpreted as evidence for the importance of meaning, these

significant associations between meaning and adjustment obviously are open to several alternative interpretations." Possibly, the perception of growth is a sign or part of an underlying broader constellation of personality traits or coping style that is associated with healthier and more effective coping leading to better adjustment. This assumed underlying habitual processing style is then responsible for both, the nature of psychological adjustment as well as the likelihood of PTG. Therefore, it might not be the perception of PTG that promotes adjustment. Another third variable that might influence PTG as well as psychological adjustment consists in the quality and nature of environmental factors and life circumstances (e.g. stability, safety, basic needs of love, support, and nurturance, support system and the like). One can assume that the same traumatic event may have a very different impact on people's lives not only due to their different personalities but due to their very diverse life circumstances.

Even if one assumes that PTG shows its adaptive effect only in the long run, the missing systematic relationship between PTG and adjustment in cross-sectional studies must be considered relevant here. The reviewed studies usually assessed PTG and psychological adjustment *several years after* the critical incident. Therefore, acute or "emergency" coping strategies should have been overcome at the time of the assessment and study participants should have managed to attain their best individual coping result. If the perception of PTG had any adaptive significance, then, this positive effect should be detectable several years after the incident even in a cross-sectional design.

4. COGNITIVE PREDICTORS OF PTG

Three aspects of the discussion point to the possibility of different cognitive factors being involved in self-perceived PTG at different stages of the coping process: a) the mixed results of the empirical literature with regard to the relationship between PTG and adjustment, b) the apparent difference between cross-sectional and longitudinal findings concerning the relationship of PTG and adjustment and c) the relation of PTG to other underlying cognitive factors (see below).

4.1. Proposition for a Two-Component-Model: The Janus Face of PTG

The idea of different cognitive predictors of PTG has been outlined in the "Janus face model of self-perceived PTG" (Maercker & Zoellner, 2004). The Roman God, Janus, was usually depicted as Janus Geminus (twin Janus), with two faces looking in opposite

directions. The Janus face model proposes a two-component model as an adequate approach to the phenomenon of self-perceived posttraumatic growth: Posttraumatic growth, hence, is considered to have a *functional*, self-transcending or constructive side, as Tedeschi and Calhoun see it, and also an *illusory*, self-deceptive, or dysfunctional side. The latter has been subject to research by Taylor and coworkers (Taylor & Brown, 1994; Taylor, Kemeney, Reed, Bower, & Gruenwald, 2000) who used the term *positive illusions*. The two faces of PTG are assumed to represent co-existing components. Most authors and researchers in the PTG field have paid exclusive attention to the functional, constructive side of PTG. The one-sided conceptualization of PTG as functional may not be justified in many cases. The Janus face model assumes that perceptions of PTG are, at least in part, distorted positive illusions that might help people counterbalance emotional distress (for similar ideas see also Taylor, 1983; Taylor & Armor, 1996). On the illusory side, statements of a trauma survivor could indicate some insight into self-deception: "If it had to happen, then, at least, it should have been good for something." The two components of PTG are assumed to have different time courses and be related differently to adjustment. The constructive side of self-perceived PTG is correlated with healthy adjustment, with its adaptive effects showing in the long run. In contrast, the illusory, self-deceptive side of PTG might be correlated with self-consolidation or even with denial in the short or in the long run.

The following statement by a bereaved wife within a therapy session may serve as an example of the *constructive/functional* side of PTG: "Although I do want him back and I wish it had not happened, it is awful for me to admit, but his death has taught me to be more appreciative of the little gifts in life. I am more thankful than before of what others do for me, like the support that is brought to me by my family and friends." In contrast, a striking impression of *self-deception* is given by an individual who has recently experienced a dramatic setback, but declares with painful and sorrowful expression in her face that the experience has not made her poorer, but instead richer and more mature. The same person is, however, not able to describe more precisely how the gained richness or maturity may manifest itself. From outside, it rather looks as if the person is currently more miserable and disillusioned than before. One can not help the impression that she tries to self-consolidate by switching losses into benefits, while simultaneously being in denial of her current distressed state. In this example, self-perceived PTG may represent a cognitive avoidance strategy which is normally assumed to be maladaptive. If the illusory component of PTG is associated with cognitive avoidance strategies such as deliberate efforts not to think about

the trauma, then, in the long run, the perception of PTG may itself become a cognitive avoidance strategy. In those cases, it will have deleterious effects on adjustment.

However, the illusory, self-deceptive side of PTG does not always simply lead to maladjustment. If the illusory perception of PTG co-exists with deliberate thinking about the trauma and does not preclude active coping efforts, then, it may serve as a short-term adaptive palliative coping strategy. A patient who was forced to be a helpless witness of an ongoing ritual sexual abuse of her husband by a mafia-like professional organization and who has lost him due to this experience after a 15 year long good marital relationship reported that "Nobody can imagine the horrors I have been through. The memories about what happened make me sad. Those people have stolen my innocence and my belief in a good world. But I also try to value the lessons I have learned. I guess I know better now what is really important. Material things or success do not mean anything to me anymore. What really counts is love and people who are close to me." This same patient who declared that love and close relationships are the most important things in her life did not, however, have any close friends or family members. Instead, she often devalued other people as being superficial and as not trustworthy. The therapist gained the impression that the proclaimed new valuing of love and close relationships was not something new to the patient, but something that she had already nurtured in her pre-trauma life and lost the capacity for its realization after the trauma. In this case, the perception of PTG, - though illusory - represents an acute coping effort with a short-term palliative function, but with neither positive nor negative long-term effects, since the individual did not deny concurrent negative life changes or psychological distress.

The realistic constructive, self-transforming component of PTG, however, should be positively related to aspects of adjustment or well-being in the long run. In successful coping with trauma, the constructive, self-transforming component of PTG is assumed to grow over time while the illusory component is assumed to decrease over time.

The two-component model (Maercker & Zoellner, 2004) might possibly explain and integrate the observation that longitudinal studies on PTG usually show positive relationships with psychological adjustment whereas the findings in cross-sectional studies usually are more inconclusive: In the longitudinal studies, the constructive side of PTG may have had a chance to manifest itself with its long-term adaptive effects. In contrast, the mixed results of cross-sectional studies mirror unknown proportions of the constructive and the illusory side of PTG being present.

4.2. Preliminary Evidence

Preliminary evidence for a two-component model comes from studies that relate the perception of PTG to different coping styles (Maercker, 1998, 1999; Maercker et al., 1999). In those studies, PTG was predicted by distinct coping strategies approximately representing the two sides of processing threat, namely a constructive side (reappraisal, active mastery in one study and problem-focused coping in another study) and a distractive, palliative side (denial/palliation in one study and emotion-focused coping in the other study). Taken together, those results point to the fact that posttraumatic growth is constituted by constructive, self-transcending statements and by illusory statements which may serve as calming down oneself immediately after a traumatic event. Empirical findings from another study (Armeli, Gunthert, & Cohen, 2001) also suggest that PTG is a multi-dimensional construct that is not predicted in all facets by the same antecedents. For example, in one dimension of PTG called *heightened self-understanding*, maladaptive coping strategies were more predictive than adaptive coping strategies. Similarly, in a longitudinal study on cancer patients undergoing bone marrow transplantation, greater use of positive re-interpretation as well as greater use of avoidance coping and alternative rewards in the pretransplant period were related to greater PTG in the posttransplant period (Widows, Jacobsen, Booth-Jones, & Fields, 2005). Those results highlight the possibility of co-existing adaptive and maladaptive processes in PTG. Results from another study can also be taken as evidence for an underlying illusory and palliative component in PTG: In a sample of parents of children treated for leukemia, PTG was positively associated with parental anxiety and cognitive avoidance of children's cancer related and medical issues after the end of treatment (Best, Streisand, Catania, & Kazak, 2001). The authors discuss the results as showing how "elevations in anxiety and avoidance may coexist with these more optimistic frameworks and may be more powerful at certain times than the perceptions of benefit" and that "individuals who are distressed may seek meaning for their situations [which] does not, however, relieve the anxiety and avoidance that accompanies the distress" (p. 306). However, in contrast to the positive association between positive perceptions of life changes after cancer (i.e. PTG) and cognitive avoidance of cancer-related issues, self efficacy cognitions, which were another factor of the above mentioned "optimistic framework," were *negatively* associated with anxiety and avoidance behavior. This result points to the salutary potential of self efficacy cognitions in contrast to positive perceptions of life changes (PTG). Therefore, one could also argue that in this study, overall, the perception of PTG served as a cognitive avoidance strategy in coping with cancer-related psychological distress.

Further evidence for the existence of self-enhancing illusions after threatening events derives from exciting psychological experiments (McFarland & Alvaro, 2000). They demonstrated that the perception of personal growth could be manipulated by the confrontation with threatening experiences and that threatening feelings about the self played a causal role in prompting illusory self-enhancing temporal comparisons which then led to the perception of personal growth. In one study, individuals were randomly assigned to focus either on a traumatic event or on a mildly negative event prior to rating their degree of self-improvement on a series of self-attributes (e.g. compassionate, wise, strong sense of inner strength, certain that I have a clear direction). Participants were asked to indicate their present level and their recalled past level - pre-event level - on those self-statements. Results revealed no differences between the two groups in regard to the level of present self ratings. However, threatened individuals (trauma condition) demonstrated heightened perceptions of improvement by deprecating the attributes they had possessed in the distant past. Their recalled ranking on the self-attributes was significantly lower than the recalled ranking of non-threatened individuals. The findings suggest that there is an illusory component to victims' perceptions of personal improvement and that these illusions derive from a distortion of the past rather than a distortion of the present.

Similar findings that point to an illusory component in the perception of personal growth were also obtained in a clinical sample of cancer patients undergoing bone marrow transplantation (BMT) (Widows et al., 2005). There was a general tendency for patients to perceive a decrease in distress over time from pre- to post-BMT that was attributable to overestimation (i.e. negatively biased recall) of distress prior to transplant, because there were no actual differences in distress measured before and after BMT. Furthermore, the amount of PTG as measured by the PTGI (Tedeschi & Calhoun, 1996) experienced by patients was related to *perceived* and *not actual* changes in psychological distress over time, whereby greater perceived improvement in distress was related to greater PTG. PTG was unrelated to actual pre- or post-BMT levels of psychological distress or concurrent level of PTSD symptomatology. The results can not demonstrate clearly the illusory component in the perception of posttraumatic growth, but they demonstrate the illusory perception of distress improvement that was associated with the perception of PTG. The findings strongly imply that greater experience of posttraumatic growth is related to perceptions of change that are attributable to deprecation of past psychological status rather than to actual changes in psychological status.

4.3. The Domination of the Constructive Side of PTG

In the following section we will give a rough overview of empirical investigations on cognitive factors and processes that have been proposed to play a role in the prediction of posttraumatic growth. Most of these researched cognitive factors resemble a constructive, potentially functional dimension. Throughout the review, the illusory component will be mentioned if applicable, although the cited authors might have not conceptualized the investigated cognitive factors this way.

4.4. Empirical Review of Habitual Cognitive Processing Styles

Parting from the traditional conceptualization, we consider some of the so-called *personality traits* as *habitual cognitive processing styles* and subsume them under this discussion. It is assumed that individuals consistently differ in their habitual ways of processing styles, but that these styles are not as stable as personality traits are considered typically. This conceptualization agrees with research findings showing that dispositional traits are not as stable as formerly thought (Davis et al., 1998; Park et al., 1996).

4.4.1. Openness to new experience (potentially functional)

Openness to new experience describes individuals who are imaginative, emotionally responsive, and intellectually curious. Therefore, these individuals might be particularly prone to "draw strength from adversity." In a study that related PTG to all personality dimensions of the "big five" in a large sample of college students, Tedeschi and Calhoun (1996) found a small, but significant cross-sectional correlation between *openness to experience* and overall PTG (see Table 4.1) that was specifically accounted for by significant correlations with the dimensions *New possibilities* and *Personal strength*. In regard to different facets of openness, especially the emotional facet correlated most strongly with PTG (see Table 4.1).

4.4.2. Hardiness and sense of coherence (potentially functional)

The concept of hardiness has originally been proposed by Kobasa (1979) and comprises a stable personality resource consisting of three sets of cognitions: Commitment, challenge, and control. Commitment captures a person's curiosity about and sense of the meaningfulness of the world. Control is the belief that one can influence the course of events. Challenge summarizes the expectation that change belongs to the normal course of life and is necessary for development. It has been proposed that a hardy personality is not

only a buffer to stress (King, King, Fairbank, Keane, & Adams, 1998), but that it might also facilitate posttraumatic growth. Preliminary support for this notion is provided by a cross-sectional study on hardiness and positive and negative changes in a sample of Israeli prisoners of war (POWs) and a control group of veterans of the Yom Kippur war (Waysman, Schwarzwald, & Solomon, 2001). Hardiness played a protective role in both groups in regard to trauma-related negative changes. In regard to positive changes, however, hardiness served as a protective factor only for those exposed to more severe traumatic stress, i.e. the POWs. Hardiness was found to be associated with higher levels of positive changes among POWs, but not in the control group.

Similar to the concept of hardiness is the concept of "sense of coherence" by Antonovsky (1993). It is also a three-fold concept including the sense that the world is comprehensible, manageable, and meaningful. Znoj (1999) found in two samples, spinal cord injured people and bereaved parents, that posttraumatic growth was moderately positively related to one aspect of the sense of coherence: The sense that the world is meaningful (Table 4.1.). These findings seem to be plausible: People who are generally convinced that the world is meaningful might find benefits and meaning from adversity more easily. However, the studies are cross-sectional, and one could critically point to the measurement and conceptual overlap of the two factors. Possibly, both measures, the SRGS (Park et al., 1996) as well as the subscale meaningfulness of the Sense-of-Coherence scale (SOC, Antonovsky, 1993), have measured the same underlying factor. Or, it is plausible that people who indicate that they generally believe in a meaningful world would also – for the sake of avoiding cognitive dissonance - more likely indicate that they found meaning from their experience.

4.4.3. Dispositional optimism (potentially functional as well as illusory)

Optimism is defined as a self-reported general expectation of good things to happen more often, relative to bad things. It is known that optimistic people usually show more flexibility in their coping strategies which therefore tend to be adaptive with regard to the problematic situation: They employ more problem focused coping in controllable situations and make more use of reframing and acceptance coping in uncontrollable situations (Scheier, Carver, & Bridges, 2001). Several studies have shown a small to moderate correlation between optimism and posttraumatic growth (Affleck, Tennen & Rowe, 1991; Curbow et al., 1993; Park et al., 1996; Tedeschi & Calhoun, 1996) (see Table 4.1). In their prospective study of people coping with the loss of a family member, Davis et al. (1997)

could demonstrate that pre-loss optimism was the only significant predictor of finding benefits 6 months post-loss (see Table 4.1). In contrast, optimism was not predictive of ”making sense of the loss.” Similar to the findings by Park et al. (1996), they found that people who reported benefits from dealing with their loss became somewhat more optimistic about life over the course of the study. The results of both studies can point out two things: First, optimism and personal growth seem to be related. Second, the relationship does not seem to be as straightforward as formerly proposed, i.e. optimism as a stable personality trait predicts personal growth as a coping outcome. Possibly, optimism and posttraumatic growth are overlapping concepts, or one concept includes the other as a subset. However, in another study, optimism and posttraumatic growth were not related (Bower, Kemeney, Taylor, & Fahey, 1998). Furthermore, the enthusiasm about the role of optimism in PTG is dampened by new refinements of the Life Orientation Test (LOT, Scheier & Carver, 1985; Scheier, Carver, & Bridge, 1994): When the old version of the LOT was employed, optimism was related to PTG. Using the revised version, however, optimism was not related to PTG (Tennen & Affleck, 1998). The reported correlations between dispositional optimism measured by the LOT and benefit finding may have simply been due to overlapping measures, since two of the original items of the optimism scale measured the ability to extract positive value from negative circumstances.

4.4.4. Internal locus of control (potentially functional as well as illusory)

An internal locus of control has been assumed to be related to PTG since it is associated with the perception and employment of personal resources that might foster a successful coping process, potentially including personal growth. Preliminary support comes from a cross-sectional study by Maercker et al. (1999) with Dresden bombing victims 50 years later: They found that the perceived posttraumatic growth was significantly associated with the extent of internal locus of control (see Table 4.1). In the study by Park et al. (1996) with younger adults, there was a significant positive correlation between perceived personal growth and the perception of controllability of the event (see Table 4.1). The difference between the two studies is that in Maercker et al.’s study, the general perception of internal control was assessed, whereas the perception of control in Park et al.’s study referred only to the controllability of the specific stressful event. Although not conceived this way by the authors of both studies, the positive associations between internal locus of control and PTG might indicate the illusory side of PTG. Traumatic events are only minimally controllable. Thus, the perception of control associated with traumatic events may hint at a cognitive

Table 4.1. *Posttraumatic Growth and Habitual Cognitive Processing Factors*

Authors	Design	Sample	*n*	Measure of post-traumatic growth	Habitual cognitive processing factor	Results
Optimism						
Park et al. (1996)	Longitudinal 2 assessments separated by 6 months	1st year college students reporting on their most negative event within the last 6 months	256	SRGS at t1 and t2	Optimism (LOT)	PTG and optimism did not correlate at T1, but at T2 (r = .27*); Optimism at T1 was not predictive of T2-grwoth. T2- growth scores were related to increases in optimism scores from time 1 to time 2 (Fchange = 5.09; R^2change = .03).
Tedeschi and Calhoun (1996)	Cross-sectional questionnaires	Undergraduate students reporting to have experienced significant negative life event (bereavement, injury related accident, separation/death of parents, or victimization)	449	PTGI	Optimism (LOT)	PTG showed moderate to low significant correlations with optimism (r = .23***) and openness to new experience (r = .21***).
			325	PTGI	Openness (NEO-Personality Inventory)	Highest associations were found for 2 subscales: "New possibilities" and "Personal strength" (for both: r = .25*** with openness and r = .22 with optimism). The overall growth score correlated most highly with the "feeling facet" of openness (r = .28***)
Bower et al. (1998)	Retrospective semi- structured bereavement interviews (ca. 8 months post-loss)	HIV seropositive men having experienced AIDS-related bereavement (mean age = 39)	40	Major shifts in values, priorities, or perspective in response to loss	Optimism (LOT)	Optimism was not related with finding meaning in any of the categories.
Davis et al. (1998)	Longitudinal T1: Pre-loss interview (3 months before death) T2: 6 months after death	Persons coping with loss of a family member (74% female; mean age = 51)	204	Open-ended question in regard to benefit finding categorized as yes, no, or partly	Optimism (LOT) at T1	Pre-loss optimism was the only significant predictor of post-loss benefit finding (b = .22**) Reports of finding benefits were marginally, but consistently related to changes in optimism.
Controllability/locus of control						
Park et al. (1996)	Cross-sectional questionnaires	College students reporting on most stressful event within last 12 months	160	SRGS	Locus of control (i.e. ratings on controllability of the event)	PTG and an internal locus of control were moderately, but significantly positively correlated (r = .24*)

Maercker et al. (1999)	Retrospective questionnaire	Dresden bombing victims (age range 57-95 years)	47	SRGS (German version)	Locus of control	Internal locus of control and PTG were significantly positively correlated (r = .34*)
Hardiness/Sense of Coherence						
Waysman et al. (2001)	Cross-sectional questionnaires	Male Yom Kippur war veterans: POWs and combat controls (18-35 years)	348	Number of positive changes after war (TABC)	Hardiness (Hardiness Inventory)	There were significant positive associations between hardiness and reports of positive changes only for POWs (r = . 24**). For combat controls, the correlation was n.s. For whole sample, hardiness showed to be a significant predictor for positive changes (beta = .11*).
Znoj (1999)	Cross-sectional questionnaire	Bereaved parents (age of child at death ranged from several months to 20 years)	176	SRGS	Sense of coherence (SOC)	The meaningfulness facet of the SOC correlated significantly with posttraumatic growth (r = .27**) and meaningfulness predicted stress-related growth (beta = .38**).
		Spinal cord injured persons	259	SRGS	Sense of coherence (SOC)	Also in the second sample did the meaningfulness facet of the SOC correlated significantly with growth (r = .24**).

Note. SRGS = Stress-Related Growth Scale; LOT = Life-Orientation Test; PTGI = Posttraumatic Growth Inventory; POWs = Prisoners of War; TABC = 5-point ratings on Trait, Attitude, and Behavioral Change; SOC = Sense of Coherence; *p < .05; **p < .01; ***p < .001.

Table 4.2. *Posttraumatic Growth and Situation-Related Cognitive Processing Factors*

Authors	Design	Sample	*n*	Measure of post-traumatic growth	Measures of situation-related cognitive factors	Results
Park et al. (1996)	Cross-sectional, retrospective, questionnaires	1st year college students reporting on their most negative event within the last 6 months	256	SRGS	Positive re-appraisal (COPE) Acceptance coping (COPE)	Significant positive correlations between PTG and coping styles emerged: with positive re-interpretation (r = .55**) and with acceptance coping (r = .36**). In a blocked RA, both were significant predictors of growth: positive re-interpretation (b = .42***) and acceptance coping (b = .19*).
Maercker (1999)	Cross-sectional questionnaire	Traumatized former political prisoners (age mean = 54)	114	SRGS	Positive re-appraisal (Coping Stress and Coping Process Questionnaire)	Positive re-appraisal and posttraumatic growth were marginally, but significantly positively correlated (r = .18*).
Znoj (1999)	Cross-sectional questionnaire	Spinal cord injured persons	259	SRGS	Positive re-appraisal (COPE) Acceptance coping (COPE)	The sample was divided into 3 groups for analysis: A. (n = 95) high growth/low distress B. (n = 52) medium growth/high distress C. (n = 112) little growth/ low distress

						Significant group differences in regard to coping strategies were evident: Specifically group A showed significantly more positive re-interpretation ($p < .001$) and acceptance coping ($p < .01$) than the other two groups.
Armeli et al. (2001)	Retrospective Questionnaire	University alumni, college students reporting on their most stressful event within past 2 years	447 472	SRGS	Positive re-appraisal (COPE) Acceptance coping (COPE)	For analysis, sample was divided into 5 groups according to high, moderate, and low stress as well as adaptive and maladaptive coping profiles. Growth was highest for those individuals who reported highly stressful event and used adaptive coping strategies such as positive re-interpretation and acceptance coping. The group with a profile of high threat and adaptive coping showed the highest growth scores.
Sears et al. (2003)	Longitudinal Questionnaire interviews	Women with early-stage breast cancer 3 months and 12 months post medical treatment	 92 60	PTGI	Positive re-appraisal (COPE)	Positive re-appraisal coping at 3 months significantly predicted posttraumatic growth at 12 months and added to its prediction above time since diagnosis and perceived cancer stress ($^{\Delta} R^2 = .08$, $^{\Delta} F$ (1, 54) = 6.94**, partial $r = .34$).
Bower et al. (1998)	Retrospective semi- structured bereavement interviews (ca. 8 months post-loss)	HIV seropositive men having experienced AIDS-related bereavement	40	Major shifts in values, priorities, or perspective in response to loss	Cognitive processing (CP) Self-constructed measure (= deliberate effortful or long-lasting thinking about death)	65% had engaged in active deliberate thinking about the death. 40% reported major value shifts. CP was significantly positively associated with finding meaning ($\chi^2 = 5.93$**). 12 out of 26 classified as high in CP, however, did not find meaning
Calhoun et al. (2000)	Cross-sectional Retrospective, questionnaire	Students having experienced a traumatic event within past 3 years (35 female; 19 male; mean age 22 years)	54	PTGI	Rumination (items rationally derived from several instruments reflecting deliberate and intrusive thinking)	Self-reported rumination soon after the trauma was positively associated with PTG ($r = .57$**). Recent rumination was also positively associated with PTG ($r = .45$**). In a regression analysis, however, only early event-related rumination remained a significant predictor of growth (beta = .47***; semi-partial correlation was $r = .32$).
Schorr and Roemer (2002)	Questionnaire survey	Commuter campus students having reported traumatic event or significant loss in their lives (90 female, 51 male; mean age 25)	141	PTGI	Sense making Rationally derived measure	Those who reported to "search for a way to make sense of their experience" were more likely to endorse experiences of PTG than those who were not trying to make sense ($t = -3.77$***). But the "feeling to have found a way to make sense" was unrelated to PTG.

Note. SRGS = Stress Related Growth Inventory; COPE = Coping- Inventory; PTGI = Post Traumatic Growth Inventory; *$p < .05$; **$p < .01$; ***$p < .001$.

illusion. Therefore, the positive association between PTG and an internal locus of control can be regarded as evidence for the potentially illusory side in PTG. The findings in Maercker's et al. study that a high internal locus of control was associated with high posttraumatic avoidance in the high trauma exposure subgroup, supports this argument.

4.5. Empirical Review of Cognitive Processing or Coping Factors

4.5.1. Positive re-appraisal (potentially functional)

Many theorists hold that the strategy of positive re-appraisal is crucial for successful adaptation to traumatic events and constitutes a pre-requisite for personal growth to occur (Calhoun & Tedeschi, 1998; Janoff-Bulman, 1992). There is preliminary evidence from several studies for the hypothesis that posttraumatic growth is related to positive re-interpretation coping (e.g. Maercker, 1999; Park et al., 1996; Sears et al., 2003). In the study of Park et al. (1996), positive re-appraisal was significantly positively correlated with reported personal growth (see Table 4.2). More far reaching conclusions can be drawn from a longitudinal study by Sears and colleagues (2003) on a sample of women with early-stage breast cancer 3 and 12 months post medical treatment. Positive re-appraisal coping at study inception (3 months) predicted - apart from positive mood and perceived health at both times (3 and 12 months) - future posttraumatic growth (at 12 months). The results indicate that the regular, effortful use of benefit-related information (positive re-appraisal) as a coping strategy is one path to the emergence of posttraumatic growth (see Table 4.2).

4.5.2. Acceptance coping (potentially functional)

The ability to accept situations that can not be changed is assumed to be crucial for adaptation to uncontrollable or unchangeable life-events. Therefore, accepting that the traumatic event happened is proposed to be one important factor within the process that can lead to personal growth (Calhoun et al., 2000). The link between acceptance coping and posttraumatic growth has been demonstrated in several studies: In the study by Park et al. (1996) mentioned earlier, acceptance coping was a significant predictor of personal growth cross-sectionally (see Table 4.2). Znoj (1999) pointed out that the relationship between PTG and acceptance coping as well as positive re-interpretation is not a linear one: Only when the sample was divided into three groups according to high, medium, and low levels of posttraumatic growth, did significant group differences in coping strategies emerge: Among other differences, significantly higher use of acceptance coping and re-interpretation coping was found in the high growth group. Similar observations come from a large cross-sectional

study of university alumni and college students reporting on their most stressful event (Armeli et al., 2001): PTG was highest for those who used adaptive coping strategies including positive re-interpretation, the use of humor and acceptance coping. Interestingly, however, only for those who had experienced a highly stressful event, were adaptive coping strategies related to PTG (see Table 4.2).

4.5.3. Sense making and the quest for meaning (potentially functional as well as illusory)

The search for meaning is considered to be central to psychological adaptation and is assumed to be associated with the perception of PTG. In a study of college students, Schorr and Roemer (2002) found the following interesting results: Those who reported searching for a way to make sense of a distressing experience and were currently distressed by PTSD symptoms were more likely to also report PTG compared to those who were not trying to make sense of anything. But reporting to having found a way to make sense of the experience was unrelated to PTG (see Table 4.2). The results may contribute evidence to the notion of PTG as a palliative coping effort, and thus, point to the potentially illusory side of PTG. The quest for meaning seems to be involved in PTG, but PTG is not necessarily linked to having found meaning. These results remind of findings by Davis and coworkers (1998) who showed that making sense of trauma is a different concept than finding benefits and that the two construals of meaning were not significantly associated and were related to adjustment in different ways.

4.5.4. Rumination (potentially functional as well as illusory)

Ruminative thinking has been generally implicated in changes in beliefs, goals, behaviors, and identity (Martin & Tesser, 1989). This conceptualization of rumination is to be distinguished from counterproductive versions of rumination described by other trauma researchers (e.g. Ehlers & Steil, 1995). Tedeschi and Calhoun (2004) regard rumination - seen as automatic or deliberate constructive thinking about the traumatic event - as one central process for the development of PTG. Preliminary support for this proposition comes from the study by Bower and coworkers (1998) mentioned earlier. They found that men who engaged in active or deliberate thinking about the death (labeled cognitive processing) were more likely to report positive shifts in their values or priorities in response to loss (see Table 4.2.). Furthermore, in a sample of students having experienced various major traumatic events, early event-related rumination was significantly positively associated with posttraumatic growth, while later rumination was not (Calhoun et al., 2000) (see Table 4.2). The

measurement of rumination in this study did not clearly distinguish between constructive, deliberate ways of thinking about the trauma and the intrusive quality of automatic event-related thinking. The differentiation between adaptive and maladaptive rumination is, however, crucial. This might explain why some study participants indicated to engage in rumination without finding benefits or meaning. Possibly, some of them have been involved in more maladaptive forms of event-related rumination or their reports reflected the existence of intrusive thoughts. In regard to both studies, one may further critically point out that there is apparent overlap in the semantics and therefore in the measurement of PTG and rumination. Therefore, the correlations between cognitive processing and posttraumatic growth might partly be measurement artifacts. Taken together, both studies support the view that cognitive processing as deliberate event-related thinking is a helpful, but not sufficient process to foster self-perceived posttraumatic growth. As outlined above, future studies should carefully consider the possibility of co-existing adaptive and maladaptive ruminative activities (see Treynor, Gonzalez, & Nolen-Hoeksema, 2003).

The empirical associations between PTG and other well-researched concepts like optimism, or openness to experience are low. PTG seems to be more strongly associated with certain cognitive coping strategies such as positive re-appraisal or finding meaning. The empirical studies cited above on positive re-appraisal, acceptance coping, and finding meaning are mainly cross-sectional in nature. Therefore, they do not allow the conclusion that those cognitive coping strategies lead to personal growth. However, the studies highlight the interrelations of self-perceived PTG and the cognitive coping factors. Depending on the theoretical viewpoint, one may regard the three concepts as parts of PTG, or, conversely, as one possible form of finding meaning. In addition, some cognitive factors show considerable conceptual (finding meaning) and measurement (rumination) overlaps with PTG.

Some of the cognitive factors that are generally regarded as adaptive, for example rumination or optimism, might also play a role in the proposed illusory side of PTG.

5. GENERAL SUMMARY AND FUTURE DIRECTIONS

The phenomenon of self-perceived PTG is still not well understood and cannot yet be described in a theoretically satisfying manner or measured with reliability and validity. PTG does not show any strong associations with well-researched concepts in psychology. Furthermore, PTG is not reliably linked to measures of adjustment. The proposed models of PTG (especially those by Tedeschi & Calhoun, 2004 as well as Schaefer & Moos, 1992) have

been of great value. However, both models implicitly assume that PTG is a positive and adaptive phenomenon, but this has not yet been demonstrated convincingly. As has been outlined by the Janus face model of PTG (Maercker & Zoellner, 2004) and by other authors (Nolen-Hoeksema & Davis, 2004; Park, 2004; Wortman 2004), the possibility of an illusory component co-existing with a constructive component in self-perceived PTG should be considered by theorists and researchers. The ongoing open debates of the significance of PTG and its role for psychological adjustment can only be resolved empirically. Naturally, more research, especially longitudinal and possibly process- oriented research, is highly needed. For more knowledge of the phenomenon of PTG, it is also important that researchers of PTG remain open to competing views concerning the phenomenon itself and the adaptive role of PTG. Therefore, it seems important that adaptive as well as maladaptive predictors or processes are studied simultaneously when investigating PTG to better disentangle one from the other. Future research could assess external criteria for the illusory side of PTG by looking at the individual's effort to avoid the negative impact of the trauma cognitively, or by gauging the individual propensity for illusory thinking in general. External criteria for the functional, constructive side could consist of measures of cognitive processing (cf. Bower et al., 1998) or of behavioral change. This would assist in enhancing the validity and pragmatic value of the PTG concept.

Future research could also adapt methodology used in research on temporal comparisons (McFarland & Alvaro, 2000) and in the study by Widows and colleagues (Widows et al., 2005) to test the proposition made by the Janus face model of an illusory component in PTG: In a longitudinal design, victims provide ratings of their current positive personal attributes as well as recollections of their pre-event or prior standings over several measurement points. These ratings on self-attributes could be related to measures of adjustment (current and recalled) as well as ratings of posttraumatic growth. This type of research could reveal whether reports of posttraumatic growth or perceived self-improvements reflect actual changes over time or perceived improvements in the absence of real changes that are attributable to condemnation of past attributes.

Another incentive for further research on PTG could come from research on the parallel construct of wisdom. All attempts to measure the empirical construct of wisdom with self-report questionnaires derived from different methodological constructs have failed to find any effects (U. Staudinger, personal communication). In wisdom research, only the content rating method using answers to thinking-aloud tasks (i.e. the recording of objectifiable performances) is used. In regard to posttraumatic growth, it is also questionable whether the

ability to introspect is really valid enough, for instance, to support and explain the statement "I have more sympathy for others." Therefore, behavioral performance tasks could contribute to the question of the veracity of reports of PTG. Recently, more quantitative measures have been employed to study PTG. However, PTG is still a phenomenon not well positioned within the theoretical and conceptual realm; therefore, qualitative studies and idiographic approaches may be of unique additional and heuristic value to the field (see also the critique by Saakvitne, Calhoun, & Tedeschi, 1998).

Moreover, the role of emotions, in particular positive ones, has been underestimated in studying PTG. Models of PTG and research studies have usually concentrated on cognitive factors, coping strategies, or personality differences when assessing predictors of PTG, but the role of emotions might play a greater role than previously assumed. The finding that specifically the emotional facet of openness to experience was linked to PTG, in contrast to the behavioral or cognitive side of openness (Tedeschi & Calhoun, 1996), concurs with this proposition. Interesting results from a recent study exemplify the possibly overestimated role of cognitive factors and the underestimated role of (positive) emotions: In a longitudinal study of college students who were assessed in early 2001 and again shortly after September 11, 2001, positive emotions in the aftermath of crisis fully accounted for the relation between pre-crisis resilience (personality trait) and post-crisis growth, conceptualized as increases in life satisfaction, optimism, and tranquility (Fredrickson, Tugade, Waugh, & Larkin, 2003). Without assessing positive emotions simultaneously, post-crisis growth would have been predicted by pre-crisis resilience. However, it was not the personality factor of resilience that played the crucial role, but the existence of positive emotions.

Another interesting and possibly fruitful field of research is the investigation of posttraumatic growth within the context of psychotherapy. Other authors (Calhoun & Tedeschi, 1998; Saakvitne et al., 1998) have already discussed the potential of psychotherapy for personal growth as well as its neglected role within therapeutic conceptualizations. Research of PTG within psychotherapy can offer exciting perspectives for exploring how change in assumed relevant factors (such as cognitive processing factors as well as affective states) might effect the emergence of PTG and how PTG is interrelated with other factors that are usually explicitly fostered in the therapeutic context such as adaptive cognitive strategies or the reduction of emotional distress.

6. CLINICAL UTILITY OF PTG RESEARCH AND CONCEPTUALIZATIONS

Having outlined some critical aspects and concerns about the concept of PTG, we would like to stress that we do consider PTG a worthwhile concept to be investigated by trauma researchers. Furthermore, we regard PTG as a new perspective worthwhile to be integrated into clinical practice. Psychotraumatology has too long focused solely on the detrimental effects of traumata and has, thus, confined the understanding of trauma recovery to a deficit oriented model. Considering PTG as a further potential outcome of coping with trauma broadens our clinical perspective. In this realm, recent attempts have been made to develop models of trauma response that encompass both, PTSD and PTG (Christopher, 2004). The concept of PTG adds a *new perspective*, not a new treatment, into psychotherapy. For example, clinicians might recognize the patient's distressing struggle to understand the impact of trauma and the distress of disbelief not solely as a posttraumatic response (deficit), but as a potential precursor to growth.

We would like to end with some thoughts on the clinical utility of PTG (for a more thorough and detailed discussion see Calhoun & Tedeschi, 1999). It seems important to raise clinicians' awareness of the possibility of growth. Only then are they able to perceive PTG, as their clients begin to consider such possibilities. For too long clinicians may have short-changed trauma survivors by focusing so closely on reducing symptoms of trauma, that they may have failed to support clients as they reflect upon their basic beliefs more generally. When the possibilities of PTG remain salient to the clinician, he or she can help the client to identifiy PTG as aspects of PTG emerge in particular sessions. Therapists should have an understanding of how the process of working through the impact of trauma is linked to the potential revision of trauma affected schemas. Traumatic events are more or less linked to life threat. These experiences may make individuals more aware of their own mortality and the fragility of life in general. This acknowledgment may lead to a heightened appreciation for life as one dimension of PTG. Also, traumatic experiences include almost always some kind of loss. Therefore, a return to the old, "innocent" pre-trauma state is often not possible. Realistic change seems to be part of the recovery process implicating PTG to be potentially an integral part of the healing process. Further, trauma survivors often have a need to understand what happened and struggle with the meaning of the event. Psychology has long focused on one aspect of meaning: meaning as causal attribution. The search for an answer to the question "why did it happen" must fail because trauma per se does not make sense - at least, if one does not find a self-deprecating explanation ("It happened because I deserve to be

punished"). The perception of PTG may add another perspective to the meaning-making need of clients: It may give an answer to the question "what for."

Psychotherapy constitutes a good context to explore positive changes in the aftermath of trauma. The simultaneous acknowledgement of patients' suffering enables them – on the basis of a trustful and intimate therapeutic relationship - to explore positive changes as result of their coping process as well. Outside of the therapeutic context, clients may have been given advice by friends to "see the positive" or "concentrate on the good things" when they talked about the negative impact of trauma. Such hasty advice is usually not helpful because it is often linked to the denial of suffering. A professional abstinence from a naïve use of positive thinking should be accompanied by an open-minded attitude on the side of the therapist allowing patients to find their own specific meanings, interpretations, ways of coping and recovery. Perceptions of growth should be supported and encouraged when they occur and clinicians can promote the active use of this growth perspective in patients' daily life. Clinicians ought, however, to remember that the absence of growth should not be regarded as a failure. Therapists should be particularly careful not to suggest that patients must grow from their experience. Such suggestions may be offensive and minimize the patient's experience. Furthermore, we would like to remind that there is no evidence up to date that PTG is necessary for successful recovery from trauma**.**

Posttraumatic growth in accident survivors: Openness and optimism as predictors of its constructive or illusory sides

Tanja Zoellner, Sirko Rabe, Anke Karl, & Andreas Maercker

Journal of Clinical Psychology 64, 1 - 19 (2008)

ABSTRACT

Posttraumatic growth (PTG), the phenomenon of self-reported positive outcomes of trauma, is assumed to consist of two sides: a constructive and an illusory side. This study investigates the relationship between PTG and its possible illusory and constructive predictors as well as the moderating role of PTSD severity. One-hundred two motor vehicle accident (MVA) survivors with full, subsyndromal, and without PTSD were assessed by multiple psychometric measures targeting PTSD severity (CAPS), posttraumatic growth (PTGI), optimism (LOT-R) and openness to experience (NEO-PI-R). Hierarchical regression analysis yielded differential interaction effects between PTSD severity and optimism, as well as openness facets pointing to the moderating role of PTSD severity in the prediction of an illusory and a constructive factor in PTG.

Keywords: posttraumatic growth; posttraumatic stress disorder; resilience; openness; optimism

7. POSTTRAUMATIC GROWTH IN ACCIDENT SURVIVORS: OPENNESS AND OPTIMISM AS PREDICTORS OF ITS CONSTRUCTIVE OR ILLUSORY SIDES

7.1. Introduction

A growing body of empirical studies reveals that many trauma survivors report personal growth after trauma besides, or in spite of, suffering from psychological distress. Calhoun, Cann, Tedeschi, and McMillen (2000) defined the concept of posttraumatic growth (PTG) as "the experience of significant positive change arising from the struggle with a major life crisis" (p. 521). Examples of positive psychological change are an increased appreciation of life, setting of new life priorities, a sense of increased personal strength, or positive spiritual change. This phenomenon has been recognized for centuries, but it is only in recent years that attempts have been made to study it systematically (Affleck & Tennen, 1996; Calhoun & Tedeschi, 2006b; Tedeschi, Park, & Calhoun, 1998). It is evident that following any imaginable trauma - including bereavement, cancer, HIV infection, plane crash, or sexual assault - at least half of all trauma survivors report some degree of personal growth that they link to their experience. What reports of PTG mean, however, is still a matter of debate (Nolen-Hoeksema & Davis, 2004). Until recently, many researchers have regarded PTG as an additional positive outcome of coping with trauma. This one-sided conceptualization of PTG as veridical and adaptive may not be justified in all cases. In light of the lack of a consistent empirical relationship between PTG and measures of psychological adjustment (Zoellner & Maerker, 2006), critical commentaries on reports of PTG increase. In line with Taylor and coworkers (Taylor, 1983; Taylor & Armor, 1996), we assume that some perceptions of PTG are, at least in part, distorted positive illusions that might help people counterbalance emotional distress. In our view, the inconsistent empirical literature in regard to the relationship between PTG and adjustment point to the possibility of different cognitive factors being involved in self-perceived PTG at different phases of the adaptation process. Different growth researchers have probably captured and studied different aspects of the phenomenon of PTG (cf. Helgeson, Kerry, Reynolds, & Tomich, 2006).

The Janus face model of self-perceived posttraumatic growth (Maercker & Zoellner, 2004; Zoellner & Maercker, 2006) considers PTG to consist of two sides, a constructive, self-transcending side, representing veridical growth as Tedeschi and Calhoun (2004) see it, and a deceptive, illusory side as Taylor and coworkers (Taylor & Armor, 1996; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000) see it. In trauma survivors who are still emotionally distressed, the perception of growth is largely assumed to be illusory, serving a self-palliative

function in order to counter-balance negative emotions. In trauma survivors who have successfully coped with the trauma and have overcome psychological distress, the perception of PTG should stem from a constructive component and,in fact,mirrors a positive adaptation to trauma. Whereas the constructive side can be brought into line with healthy adjustment in the long run, the illusory side might be in the service of short-term palliation with no association to long-term adaptation. This supposition would explain that cross-sectional studies usually find no systematic relation between growth and distress, whereas results of the few longitudinal studies suggest a slightly negative relationship between growth and distress over time (e.g. Frazier, Conlon, & Glaser, 2001; Davis, Nolen-Hoeksema, & Larson, 1998). To capture the proposed components of PTG, we suggested first to rely on well-validated constructs to maximize external validity because the prediction of PTG still awaits its solid anchoring in the psychometric realm (Maercker & Zoellner, 2004). We suggest that the two faces of PTG may be captured by the constructs of "optimism" and "openness to new experience", with optimism representing the illusory and openness the constructive side.

Optimism is defined as a self reported general expectancy of good things to happen relative to bad things (Scheier, Carver, & Bridge, 1994). Although adaptive, this attitude nevertheless mirrors the holding of a positive illusion because a good outcome is as probable as a bad outcome. Experiments demonstrate that the perception of threat to the self triggers self-enhancement illusions and that those positive illusions are biased in nature (McFarland & Alvaro, 2000). People higher in dispositional optimism are considered to make more use of positive illusions than persons low in optimism. Lechner and Antoni (2004) found evidence that some of the reports of PTG in their sample of early-stage breast cancer patients were, in fact, non-veridical, defensive reports of growth. Furthermore, they were able to show that the need to adopt a positive attitude was significantly related to higher PTG. This suggests that people who are self-reported "positive thinkers" (optimists) may feel the need to report that they have grown from their experience, whether or not they truly have. The existing studies on the relationship between optimism and PTG have shown a small to moderate correlation between the two constructs (e.g. Affleck & Tennen, 1996; Curbow, Somerfield, Baker, Wingard, & Legro, 1993).

Openness is defined as the tendency to be interested in new situations, new ideas, and new experiences. Individuals high in openness are imaginative, creative, emotionally responsive, and intellectually curious (Costa & McCrae, 1985). Openness to new experiences captures the ability to manage the uncertainty of life effectively, to acknowledge the constant nature of change, and the ability to develop with change rather than work against it. One can

assume that individuals high in openness are able to deal better with traumatic events and trauma-induced life changes and may be particularly prone to "draw strength from adversity" (Tedeschi & Calhoun, 1996). In line with other growth researchers, we regard cognitive processes to be important for the emergence of PTG. Therefore, specifically, the cognitive facet of openness, openness to new ideas, should facilitate personal growth after trauma because open-minded individuals should be more willing to think deliberately about the impact of the trauma on their lives. The "cognitive openness" must, however, be based on an openness to intense feelings because a certain tolerance for intense emotional distress that accompanies the struggle with trauma seems essential. Tedeschi and Calhoun (1996) found a small, but significant cross-sectional correlation between openness and posttraumatic growth.

7.2. The Present Study

We assessed posttraumatic growth in a sample of motor vehicle accident (MVA) survivors as part of a larger research project on psychological and psychophysiological factors of chronic PTSD in MVA survivors at the University of Dresden, Germany. The main purpose was to investigate PTG in MVA survivors with full, subsyndromal and without PTSD and to explore its illusory and constructive side in relation to PTSD severity. In particular, the following hypotheses were tested:

1. We predict group differences in subscales of the Posttraumatic Growth Inventory (PTGI) between MVA survivors with and without PTSD because different facets or domains of PTG such as a hightened appreciation of life or the setting of new life priorities are more or less likely to be associated with the illusory or the constructive side of PTG. We hypothesize that the overall PTGI score will, however, not be different between groups.
2. We further hypothesize that trauma severity will be positively related to PTG because threat severity is thought to motivate PTG independently from whether PTG is only perceived or veridical.
3. We predict that both, optimism (illusory component) and openness to new ideas and intense feelings (constructive factor) will be related to PTG in the whole sample of MVA survivors.
4. Further, PTSD severity will moderate the predictive pattern of PTG with regard to optimism and the openness dimensions. Optimism will be more predictive of PTG in MVA survivors with high PTSD severity whereas openness will be more predictive of PTG in MVA survivors with low PTSD severity.

7.3. Method

7.3.1. Participants

German survivors of severe MVAs were recruited through self-referral via local media coverage and advertising. Because this report is part of a larger study concerned with psychological and psychophysiological correlates of chronic PTSD, we included only participants with the accident having occurred at least 6 months prior to testing. Severe MVAs were defined by life threat, severe injury, or severe vehicle damage. Exclusion criteria were a history of neurological problems (e.g. epilepsy), brain surgery, brain damage, and/or severe head injury during the accident. Furthermore, we exlduded participants with current alcohol and/or substance abuse or dependence and current or past schizophrenic, bipolar, or psychotic disorders. From 239 MVA survivors who contacted the research team and were screened by telephone for accident features and PTSD, 132 were offered appointments for assessments. After completion of the diagnostic interview, 108 MVA survivors finally qualified as participants of the study. Due to incomplete data, 6 were excluded from the data analysis. The final sample consisted of 102 MVA survivors.

7.3.2. Measures

Injury severity. Injury severity was assessed with the Injury Severity Score (ISS), which was abstracted from medical records using the Abbreviated Injury Scale (AIS 90; Association for the Advancement of Automotive Medicine, 1990). The ISS is defined as the sum of the squares of the highest scores on the AIS 90 for each of the three most severely injured body regions.

Trauma severity. Participants indicated levels of subjective accident severity on a 4-point Likert scale and level of life threat (0-100%). They were also asked to describe and indicate level of injuries of self and others, report number of inpatient and outpatient treatment days, and severity of car damage and other people's injuries. An objective accident severity score was computed as a mean of the z-transformed scores of injury severity (ISS), days of treatment, and extent of other people's injury severity, yielding a score range between -1 to 1.

Posttraumatic Stress Diagnosis. The current and lifetime diagnosis of PTSD was tested by means of the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995; German version by Schnyder & Moergeli, 2002), a structured clinical interview of demonstrated reliability and validity developed by the National Center for PTSD. The CAPS generates categorical diagnoses of current and lifetime PTSD, as well as a total PTSD severity score obtained by summing the ratings of frequency and intensity of each of the 17 symptoms

defined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV;* American Psychiatric Association [APA], 1994). Using 5-point (0-4) Likert-type rating scales, frequency and intensity ratings are summed for each symptom to yield a severity score (0-8) with higher scores indicating higher PTSD severity. The symptom is present with a score of at least 3 on the severity rating. The CAPS has excellent psychometric properties, with test-retest-reliability ranging from $r = .90$ to .98 and an internal consistency of $\alpha = .94$ for the total score (Blake et al., 1995; Wilson & Keane, 1997). The German version of the CAPS has comparable reliability and validity, with Cronbach's alpha at .88 after 5 days and .92 after 6 months post-trauma (Schnyder & Moergeli, 2002). In this sample, Cronbach's coefficient alpha was .89 for the total score.

In this report, only current diagnoses of MVA related PTSD (at least 3 months) were considered. Participants with a history of other traumata were only included in the study if their current PTSD diagnosis was related to the MVA and not to other traumata. We classified the MVA participants into three groups on the basis of the CAPS: (Full) PTSD, or subsyndromal PTSD, and no PTSD. Participants were classified as suffering from PTSD if they met all three symptom clusters (B-D) according to the *DSM-IV* criteria (APA, 1994). They were classified as subsyndromal if they met the *DSM-IV* Cluster B (reexperiencing) and either Cluster C (avoidance-numbing) or Cluster D (hyperarousal) criteria, following the most recognized definition of subsyndromal proposed by Blanchard and colleagues (Blanchard et al., 2003; Blanchard, Hickling, Taylor, Loos, & Gerardi, 1994). Similar to PTSD participants, participants with subsyndromal PTSD were also required to meet Criterion F (experiencing distress because of their PTSD symptoms). The non-PTSD group was required to meet either no cluster or only one (but never Criterion F).

Posttraumatic growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996; German version by Maercker & Langner, 2001) is a 21-item self-report measure of the degree of reported positive changes following traumatic experience, e.g. an increase in "a feeling of self-reliance," "a sense of closeness with others," or "the development of new interests." The original version of the instrument asks the person to answer questions about changes which occurred "in your life as a result of your crisis." For this study, the original formulation of "your crisis" was amended to "your traumatic accident." Participants rated their experience of growth using a 5-point response format ranging from 0 (not at all) to 4 (very strongly), resulting in a range from 0 to 84. All 21 items are positively scored, with higher scores indicating greater experience of posttraumatic growth. The original German version of the PTGI used a 3-point scale whereas the original

English version employs a 6-point scale. In order to retain the uneven rank number of the German scale and at the same time to allow for more differentiation within the range, a 5-point Likert scale was applied, as recommended by Maercker (oral communication, October 7, 2002). Thus, the questionnaire format corresponded with the 5-point Likert format of nearly all the other questionnaires in the package (for a similar procedure see Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003). In this sample, Cronbach's alphas were .93, .84, .88, .71, .83, and .86 for the PTGI total score and the five subscales: New Possibilities, Relating to Others, Appreciation of Life, Personal Strength, and Spiritual Change, respectively.

Optimism. The study employed the German adaptation of the Life-Orientation-Test-Revised form (LOT-R; Scheier et al., 1994; German version: Glaesmer & Hoyer, 2003). The LOT-R is a 10-item (6 target items and 4 filler items) self-report scale. Respondents are asked to indicate the extent of their agreement with each of the items on a 5-point scale (0-4). Examples of items are "In uncertain times I usually expect the best," and "Things never work out the way I want them to." Negatively worded items are reverse coded before scoring. Raw scores range from 0 to 24 with higher scores indicating higher optimism. In validation studies (Scheier et al., 1994), internal consistency was acceptable (α = .78). In this sample, Cronbach's alpha was .82.

Openness to Experience. Openness was assessed by the German adaptation of the Openness to Experience scale of the NEO Personality Inventory Revised (NEO-PI-R; Costa & McCrae, 1985, 1992; German version by Borkenau & Ostendorf, 1993). We were interested in two subdomains, the cognitive and emotional facets of openness to experience (openness facet of ideas and of feelings). Examples for the two facets of openness are: openness to new ideas ("I enjoy playing with abstract theories and ideas") and openness to intense feelings ("I experience a wide range of feelings and sensations"). Negatively worded items are reverse coded before scoring. Each openness scale consists of 8 items rated on 5-point Likert scale (0-4) with a score range from 0-32 with higher scores indicating higher openness. The NEO-PI is a widely used and well validated measure with an internal consistency of Cronbach's alpha = .85 or above and test-retest reliabilities of r = .86 or greater over 6 months (Costa & McCrae, 1985). In this sample, Cronbach's alpha was .79 for openness to new ideas and .78 for openness to intense feelings.

7.3.3. Procedures

Advanced postgraduate and doctoral students in Clinical Psychology conducted all assessments after extensive training. At the initial visit, participants gave written informed consent, and the procedure was approved by the university ethics board. A 2- to 3- hour initial

assessment contained structured accident and clinical interviews. Participants also filled out a set of questionnaires at home.

7.3.4. Data analysis

Predictor variables were trauma characteristics, PTSD diagnosis and PTSD severity, optimism, as well as openness to new ideas and intense feelings. Outcome variables were the overall growth score as well as growth domains of the PTGI. All analyses were performed using SPSS for windows (version 12.0). To test the hypothesized interaction of group and PTGI domains, we first conducted a multivariate measures analysis of variance (MANOVA) with group as between factor and PTGI domains as within factors, followed by univariate ANOVAs and post hoc Tukey tests to examine specific group differences for each PTGI subscale seperately. Here, we focus on effect sizes versus statistical significance as currently recommended (e.g. Wilkinson & The Task Force on Statistical Inference, 1999). We report both the amount of variance accounted for by group (partial η2) for the five PTGI subscales and standardized mean differences (Cohen's *d*) for separate group differences.[1] We further calculated bivariate correlations to test the magnitude and direction of associations among variables. To test the hypothesis of a differential prediction of a constructive and an illusory factor in PTG dependent on the level of distress, a planned hierarchical regression analysis was performed. In the hierarchical regression analysis, interaction terms were computed by obtaining the cross product of PTSD severity (CAPS score) and predictor variables (optimism and openness). Subjective trauma severity and PTSD severity were entered in the first step, optimism and openness scales were entered in the second step, and the interaction terms were entered in the third step. The criterion for entry into and for being retained in regression equations was a significance level of at least $p = .05$. The predictor variables were centered before testing the significance of interaction terms to eliminate possible multicollinearity effects between first-order terms (predictor) and the higher-order terms (i.e. the interaction terms), as recommended by Holmbeck (1997).

7.4. Results

Demographic information, trauma severity features, PTSD severity, optimism and openness scores are presented in Table 7.1. for the three diagnostic groups. With regard to

[1] For interpreting partial η2, .01 is a small effect, .06 is a medium effect, and .14 is a large effect. For *d,* .2 is small, .5 is medium, and .8 is large.

Table 7.1. *Descriptive Data for Motor Vehicle Acciden Survivors Without PTSD, With Subsyndromal PTSD, and Full PTSD*

	Group			Univariate ANOVAs			Post hoc Tukey		
							Group comparisons		
	Non-PTSD (0)	Sub. PTSD (1)	Full PTSD (2)	*F*	*p*	*Partial* η^2	0 vs 1 *p*	0 vs 2 *p*	1 vs 2 *p*
Demographic Variables									
Age									
M	42.3	39.2	42.1	0.6	.57	--			
SD	14.4	11.5	12.1						
Sex ratio (M/F)	19/24	7/22	6/24	5.7[a]	.06	--	.08[a]	.03[a]	.07[a]
Income (EU)									
M	2039	1867	1999	0.1	.88	--			
SD	1423	878	1808						
Trauma Variables									
Objective Severity (-1–1)									
M	0.0	0.0	0.0	0.1	.95	--			
SD	0.6	0.8	0.7						
Subjective Severity (1 – 4)									
M	2.9	2.9	3.4	4.2	.02	.08	.99	.03	.04
SD	0.9	1.1	0.7						
Life Threat (1 – 100)									
M	51.5	60.6	54.4	0.3	.20	--			
SD	45.1	39.7	45.8						
Years since Trauma									
M	7.4	5.4	6.8	0.8	.45	--			
SD	7.5	3.7	7.5						
PTSD Severity									
CAPS									
M	10.2	31.3	59.8	193.0	<.001	.80	<.001	<.001	<.001
SD	6.1	10.6	14.9						
Illusory Factor									
Optimism									
M	15.1	13.8	12.4	3.0	.06	.06	.49	.04	.48
SD	3.6	5.4	5.0						
Constructive Factor									
Openness to ideas									
M	21.2	20.1	17.2	5.0	.01	.09	.69	.01	.09
SD	5.4	4.3	6.1						
Openness to feelings									
M	22.3	22.5	19.5	3.8	.03	.07	.97	.05	.05
SD	5.1	4.1	5.0						

Note. PTSD = Posttraumatic Stress Disorder; CAPS = Clinician Administered PTSD Scale.
[a] Test = χ^2.

trauma features, results of ANOVAs followed by paired comparisons revealed significantly higher scores in subjective trauma severity in the PTSD group compared to the non-PTSD and the subsyndromal group. Further, there were significant group differences in the male to female ratio, with the PTSD and the subsyndromal group having more female participants. Motor vehicle accident survivors with PTSD reported significantly lower scores in both openness scales and in optimism than MVA survivors without PTSD (see Table 7.1).

7.4.1. Posttraumatic growth in motor vehicle accident survivors without PTSD, with subsyndromal PTSD, and with full PTSD

The first study objective was to compare MVA survivors with full, subsyndromal PTSD, and without PTSD in regard to their perception of PTG. It was hypothesized that the three groups would report a similar overall growth score, but would show a different "growth pattern." The results supported this prediction. The MANOVA with group as between factor and PTGI-domains as within factor revealed a highly significant main effect for PTG domain, $F(4,1) = 55.8$, $p < .001$, and a significant interaction effect for group x PTG domain, $F(8, 2) = 4.5$, $p < .001$, but no main effect for group, $F(2, 99) = 0.4$, $p = .66$. Univariate comparisons revealed that the group x domain interaction effect was accounted for by group differences of medium size in the growth domains of Appreciation Of Life (partial $\eta^2 = .06$), Personal Strength (partial $\eta^2 = .05$) and Spiritual Change (partial $\eta^2 = .06$) specifically between the PTSD and the non-PTSD group (see Table 7.2).

The MVA survivors with PTSD had lower scores in personal strength (Cohen's $d = -.52$), but higher scores in Appreciation of Life (Cohen's $d = .52$) and Spiritual Change (Cohen's $d = .51$) than MVA survivors without PTSD. The single group difference between the PTSD and the subsyndromal group was found in the PTG domain Spiritual Change with the PTSD group reporting higher growth (Cohen's $d = .58$). These results correspond with the correlational analysis of PTSD severity and PTGI domains. Posttraumatic stress disorder severity was significantly negatively correlated with Personal Strength and significantly positively correlated with Appreciation of Life and Spiritual Change (see Table 7.3).

7.4.2. Trauma severity as predictor of PTG

In line with prediction, objective and subjective trauma severity were significantly positively related with the overall growth score (see Table 7.3). Whereas greater objective severity was associated significantly with higher growth scores in the subdomains New

Table 7.2. *Group Means and Standard Deviations on Subdomains of Posttraumatic Growth and Group Mean Comparisons*

	Non PTSD	Sub. PTSD	Full PTSD	Univariate ANOVAS			Post hoc Tukey					
							Non-PTSD vs Sub. PTSD		Non- PTSD vs PTSD		Sub. PTSD vs PTSD	
Posttraumatic growth	*M* *SD*	*M* *SD*	*M* *SD*	*F(2, 99)*	*p*	*Partial* η^2	*p*	*d*	*p*	*d*	*p*	*d*
Overall	38.5 17.1	38.4 15.8	40.2 18.4	0.1	.90		--	--	--	--	--	--
New Possibilities	8.2 5.0	7.4 4.5	7.5 5.6	0.2	.79	.01	--	--	--	--	--	--
Relating to Others	13.7 6.8	14.7 6.9	15.1 7.6	0.4	.70	.01	--	--	--	--	--	--
Appreciation of Life	7.1 2.7	8.2 2.5	8.7 3.6	3.0	.05	.06	.22	.38	.06	.52*	.82	.16
Personal Strength	7.6 4.0	6.3 3.4	5.6 3.7	2.8	.07	.05	.30	-.35	.06	-.52*	.76	-.20
Spiritual Change	2.0 2.5	1.8 2.3	3.4 3.1	3.3	.04	.06	.94	-.08	.08	.51*	.06	.58*

Note. PTSD = Posttraumatic Stress Disorder.
* $p < .05$ when using *t*-test statistics.

Table 7.3. *Intercorrelations among Trauma Variables, CAPS, Optimism, Openness Facets and Posttraumatic Growth for Whole Sample*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Obj. trauma severity	--	.42***	.05	.28**	.04	-.04	.12	.12	.20*	.27*	.15	.10	.20*	.02
2. Subj. trauma severity		--	.13	.14	.31**	-.08	.15	.10	.29*	.21*	.33*	.18	.08	.26*
3. Life threat			--	.22*	.29**	.06	.14	.27**	.17	.10	.16	.16	.08	.16
4. Time since trauma				--	-.08	-.18	.15	.07	.16	.21*	-.01	.10	.25*	.10
5. PTSD severity					--	-.22*	-.27**	-.18	.10	.03	.15	.28**	-.20*	.20*
6. Optimism						--	.27**	.22*	-.05	.01	-.11	-.02	.04	-.06
7. Openness to ideas							--	.51***	.18	.15	.17	.08	.18	.10
8. Openness to feelings								--	.14	.11	.13	.09	.15	.07
9. PTGI total									--	.88***	.87***	.71***	.78***	.56***
10. New Possibilities										--	.62***	.62***	.72***	.34***
11. Relating to Others											--	.48***	.56***	.41***
12. Appreciation of Life												--	.42***	.39**
13. Personal Strength													--	.27**
14. Spiritual Change														--

Note. PTSD = Posttraumatic Stress Disorder; CAPS = Clinician Administered PTSD Scale; PTGI = Posttraumatic Growth Inventory.
*$p < .05$; **$p < .01$; ***$p < .001$.

Possibilities and Personal Strength, greater subjective severity was related to higher growth scores in New Possibilities, Relating to Others, and Spiritual Change. Time since trauma was only significantly related to higher growth scores in the PTGI domains New Possibilities and Personal Strength, but not to the overall PTGI score. All significant correlations were low to moderate in strength (r = .2 to r = .33).

7.4.3. Openness and optimism as predictors of PTG

Contrary to Hypothesis 3, neither optimism as representative of the illusory side nor the two openness facets as representative of the constructive side were significantly related to PTG, neither to the overall score nor to any of the subdomains of the PTGI looking at all MVA survivors together (Table 7.3). Results of the hierarchical regression analysis with the overall PTGI score as outcome variable, however, supported the hypothesis of a differential prediction of PTG by optimism and openness dependent on PTSD severity (see Table 7.4).

Table 7.4. *Summary of Hierarchical Regression Analysis for Variables Predicting Posttraumatic Growth in Motor Vehicle Accident Survivors (n = 102)*

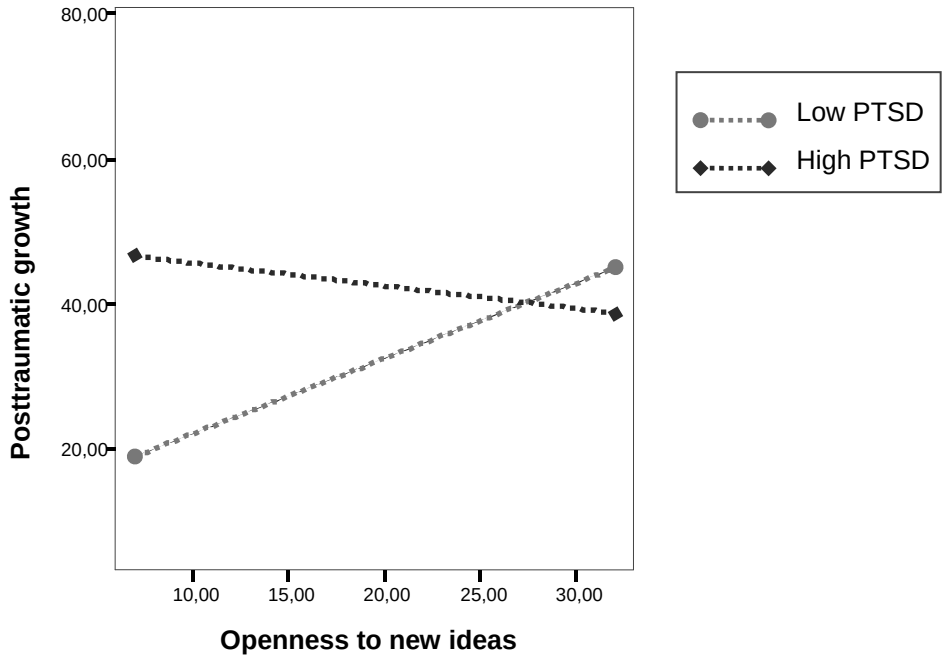
				Posttraumatic Growth Inventory - Sum			
	R^2	F	ΔR^2	ΔF	B	$SE\ B$	β
Step 1	.08*	4.41*					
Subjective trauma severity					5.24	1.89	.28**
PTSD severity (CAPS)					0.01	0.07	.15
Step 2	.11	2.46*	.03	1.14			
Subjective trauma severity					4.28	1.96	.23*
PTSD severity (CAPS)					0.05	0.08	.07
Optimism					-0.25	0.37	-.07
Openness to ideas					0.46	0.36	.15
Openness to feelings					0.24	0.39	.07
Step 3	.19*	2.69*	.08*	2.85*			
Subjective trauma severity					4.95	1.97	.27*
PTSD severity (CAPS)					0.03	0.08	.04
Optimism					-1.49	0.68	-.41*
Openness to ideas					0.47	0.53	.15
Openness to feelings					0.19	0.38	.05
CAPS x optimism					0.04	0.02	.42*
CAPS x openness ideas					-0.03	0.02	-.25*
CAPS x openness feelings					-0.00	0.02	-.01

Note. PTSD = Posttraumatic Stress Disorder; CAPS = Clinician Administered PTSD Scale.
*p < .05; **p < .01.

The hierarchical regression analysis for predicting posttraumatic growth yielded significant main and significant interaction effects explaining 19% of the variance in PTG.

Subjective trauma severity remained a significant predictor of PTG throughout all steps of the regression, explaining 8% of the variance. In the final model, optimism also constituted a significant predictor of PTG (b = -.41, p < .05). The association between optimism and PTG was inverse, indicating that MVA survivors with low optimism reported greater PTG than those with high optimism. Furthermore, the influence of optimism on PTG was moderated by PTSD severity as evidenced by the significant CAPS x optimism interaction effect (b = .42, p < .05). There also was a significant CAPS x openness to new ideas interaction effect (b = -.25, p < .05) that pointed into the opposite direction. To analyze the meaning of the interaction terms further, regression lines were computed for high and low PTSD severity scores using one standard deviation above and below the mean as suggested by Aiken and West (1991). For MVA survivors with low PTSD severity, there was a strong positive relationship between openness to new ideas and PTG (see Figure 7.1). That is, low distressed MVA survivors with greater openness to new ideas reported higher levels of PTG compared to those with lower openness to new ideas. For MVA survivors with high PTSD severity, however, openness to new ideas was not related to reports of growth.

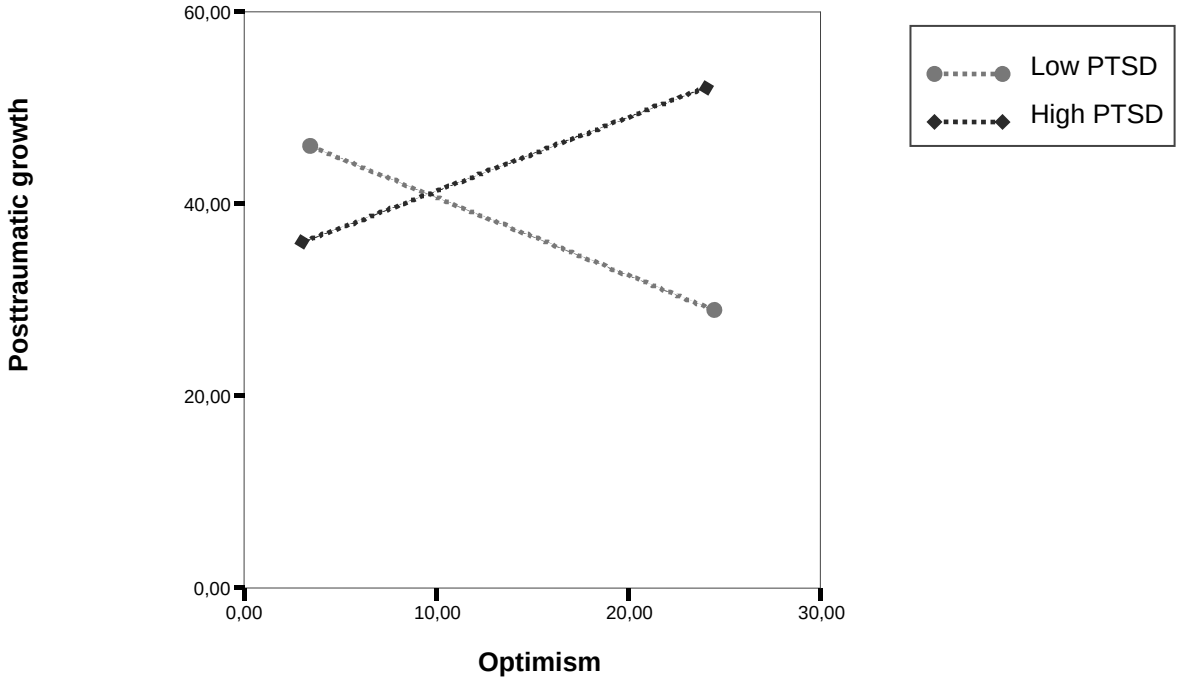
Figure 7.1. *Regression Lines of Openness to New Ideas and Posttraumatic Growth for Motor Vehicle Accident Survivors with High and Low Posttraumatic Stress Disorder Severity*



Note. High and low values of PTSD severity represent the mean scores ± 1 standard deviation for each variable.

Almost the opposite pattern was evident in regard to the relationship between optimism and PTG depending on PTSD severity. For MVA survivors with low PTSD severity, greater optimism was related to lower reports of growth. In contrast, for MVA survivors with high PTSD severity, greater optimism was related to higher reports of growth (see Figure 7.2).

Figure 7.2. *Regression Lines of Optimism and Posttraumatic Growth for Motor Vehicle Accident Survivors with High and Low Posttraumatic Stress Disorder Severity*



Note. High and low values of PTSD severity represent the mean scores ± 1 standard deviation for each variable.

7.5. Discussion

This study examined posttraumatic growth and its prediction by optimism and openness among MVA survivors with PTSD, with subsyndromal PTSD, and without PTSD. In accordance with our hypothesis, MVA survivors with PTSD did not differ in their overall growth score from MVA survivors without PTSD or with subsyndromal PTSD. This finding fits with results of most cross-sectional studies that do not find a consistent relationship between PTG and PTSD (see Zoellner & Maercker, 2006). However, the three groups differed meaningfully in subdomains of posttraumatic growth with medium size differences specifically between the PTSD and the non-PTSD group. The MVA survivors without PTSD showed a higher growth score in the perception of Personal Strength than the PTSD group,

probably mirroring the fact that they had dealt with the traumatic experience effectively. In contrast, MVA survivors with PTSD revealed higher growth scores in the perception of Appreciation of Life and Spiritual Change than the non-PTSD group. As fas as we are aware of, there is no other empirical study that investigated diagnoses' group differences in regard to subdomains of PTG. If future studies replicate these results, the found diagnoses' group differences support the hypothesis of differential meaning and signficance of the perception of PTG at different stages of the trauma coping process.

In comparison to results of other studies on PTG (see Powell et al., 2003), the overall means of the PTGI were quite low in our sample. One possible explanation for the low PTG score might be cultural differences between US-Americans and Germans in their attitude towards "getting positives out of deteriorating events." Self-reported growth may, in part, reflect adherence to a cultural script (Linley & Joseph, 2004). Due to a "tyranny of positive thinking" (Lechner & Antoni, 2004) trauma survivors in the United States might feel more social pressure to report having grown from adversity than trauma survivors in Germany or other European countries. In line with this supposition, Steger and coworkers found that reports of growth following terrorist events were higher in the United States than in Spain (Steger, Frazier, & Zacchanini, cited in Frazier & Kaler, 2006).

In line with prior findings (e.g. Cordova, Cunningham, Carlson, & Andrykowski, 2001; Helgeson et al., 2006; Maercker & Herrle, 2003), a dose-response-relationship - although it was small - between trauma exposure (severity) and posttraumatic growth was supported by the data. Both objective and subjective trauma severity correlated significantly with the overall PTGI score indicating that those who have experienced a more severe accident did report greater posttraumatic growth. In the subjective rating of trauma severity, a potential retrospective bias must be considered, depending on the level of current PTSD severity. Nevertheless, it certainly makes sense that a trauma would need to be more severe before people would make serious changes in terms of revision of a cognitive schema.

In contrast to some previous investigations, (Cordova et al., 2001; in a sample of breast cancer patients), we did not find that level of life threat or length of time since trauma were related to amount of reported growth. The latter finding might be explained by the fact that, on average, several years had passed since the accident for our participants. Therefore, the amount of reported growth may have largely stabilized by the time the assessment took place, meaning that more time would not necessarily be associated with more growth.

In contrast to previous studies (Affleck & Tennen, 1996; Curbow et al., 1993; Tedeschi & Calhoun, 1996) that found a positive relationship between PTG and optimism and

openness, we found no significant correlations between PTG and the two factors in the whole sample. Results of the hierarchical regression analysis even revealed a significant negative relation between PTG and optimism showing that MVA survivors with low optimism indicated higher PTG. In line with prediction of the Janus face model, results of the regression analysis also showed that optimism and openness played differential roles in the prediction of PTG dependent on PTSD severity. For MVA survivors with high PTSD severity, higher levels of optimism were associated with higher levels of PTG, whereas for MVA survivors with low PTSD severity, lower levels of optimism were associated with higher growth. In contrast, greater openness to new ideas predicted higher PTG in MVA survivors with low distress, but not in those with high PTSD severity. These results are in line with previous studies that also found PTG to be a mutli-dimensional construct that was predicted by both, adaptive and maladaptive coping processes such as positive re-interpretation and avoidance coping (Armeli, Gunthert, & Cohen, 2001; Maercker, Herrle, & Grimm, 1999; Widows, Jacobsen, Booth-Jones, & Fields, 2005).

The amount of overall explained variance of 19 % in PTG is rather small. Nevertheless, given that reliable moderator effects are very difficult to detect, even effects that explain an additional variance of only 1% should be considered important (Finney, Mitchell, Cronkite, & Moos, 1984; McClelland & Judd, 1993). The detected moderator effects in this study may point to nonmarginal results that elucidate the cognitive processes involved in the self-perception of PTG as moderated by current distress severity. In consideration of the relatively small sample size, the regression analysis should be regarded as exploratory.

We found significant differences between MVA survivors with PTSD and those without PTSD in optimism and the two openness facets, with the non-PTSD group having higher scores in all three factors. The result of significantly lower optimism in the PTSD group does not contradict our hypothesis because we did not predict that the PTSD group would show higher optimism per se, but that optimism would play a more important role in the prediction of PTG in the PTSD group. Regarding the relations among those variables, it is noteworthy that the CAPS score was inversely related to optimism and openness facets, whereas CAPS and posttraumatic growth were not associated. These findings suggest that PTG - unlike optimism and openness - is not reliably linked to typical indicators of adaptation.

Our sample included only traumatized individuals with MVA. Especially in the development of PTG, the trauma type may play an important role. Furthermore, culture may

influence the "preparedness" to perceive PTG after trauma. Therefore, the results of our study on a German population of traumatized MVA survivors may not be generalizable to other trauma populations or populations with different cultural backgrounds. Future studies on PTG and its potential illusory and constructive sides with other populations such as samples of veterans from Iraq, survivors of sexual abuse or domestic violence, or survivors of natural disasters will further enhance our understanding of the phenomenon of PTG.

To address another limitation, third variables that might influence the relationship between trauma or PTSD severity and PTG may exist. For example, we did not measure perceived level of social support subsequent to the accident. Individuals in highly traumatic car accidents may in fact have received more social support than those who were in relatively minor accidents. Thus, any personal growth may have been facilitated by increased social support.

Finally, the study was only cross-sectional. To test the hypotheses of the Janus face model, i.e. the differential roles of the illusory and the constructive factors in self-perceived posttraumatic growth, a longitudinal design will be needed in future studies.

7.6. Conclusions

Overall, results of this study indicate that posttraumatic growth as measured by the PTGI is not a unitary construct. First, different subdomains seemed to be differentially important depending on concurrent PTSD severity, whereas the overall PTG sum score was not different among the three PTSD severity groups. Second, self-reported PTG was differentially predicted by the factors optimism and openness facets in high- and low-PTSD severity groups. These findings highlight the fact that there are important functional differences in the cognitive processes involved in self-perceived growth between trauma survivors with no or low psychological distress symptoms and trauma survivors with high distress. Some reports of growth may mirror self-enhancement cognitions to deal with distress (as part of the coping process), whereas others may mirror veridical growth as an outcome of coping. Difficulties with the construct of PTG, measurement, conceptualization of PTG as a result of coping or coping effort, and its adaptive significance are discussed in detail elsewhere (see review by Zoellner & Maercker, 2006). Future studies, preferably with a longitudinal design and other measurement methods for the illusory and the constructive factors in PTG, may enrich the theoretical conceptualization of PTG and further a critical investigation of the significance of the phenomenon.

Posttraumatic growth as outcome of a cognitive-behavioral therapy trial for motor vehicle accident survivors with PTSD?

Tanja Zoellner, Sirko Rabe, Anke Karl, & Andreas Maercker

(submitted)

ABSTRACT

Treatment effects on posttraumatic growth (PTG) were investigated within a classical cognitive-behavioral treatment (CBT) program for PTSD. Forty motor vehicle accident survivors were randomly assigned to a treatment or a waiting condition. Posttraumatic growth was measured by the PTGI (Tedeschi & Calhoun, 1996) and complemented by its possible predictors (optimism, openness). The CBT treatment proved to be highly effective in terms of PTSD symptom reduction (CAPS). In contrast to previous findings, there was no treatment effect on PTG in general. The CBT group showed, however, increases in PTG subdomains „New Possiblities“ and „Personal Strength“. The results of this study caution researchers to naivly use PTG as a positive outcome measure to evaluate treatment effectiveness.

Keywords: posttraumatic growth; posttraumatic stress disorder; cognitive behavioral treatment; intervention study; motor vehicle accident survivors

8. POSTTRAUMATIC GROWTH AS OUTCOME OF A COGNITIVE-BEHAVIORAL THERAPY TRIAL FOR MOTOR VEHICLE ACCIDENT SURVIVORS WITH PTSD?

8.1. Introduction

Researchers conducting clinical intervention studies have usually assessed psychological distress variables as outcome measures to evaluate treatment effectiveness. Although the experience of trauma can be accompanied by extreme psychological distress and emotional impairment for years, many trauma survivors also experience positive psychological changes after trauma. This phenomenon, called posttraumatic growth (PTG), has recently gained growing attention by trauma researchers and clinicians. PTG is defined as the subjective experience of positive psychological change reported by an individual as result of the struggle with trauma. Examples of PTG are an increased appreciation of life, setting of new life priorities, improved closeness of intimate relationships, or positive spiritual change (Tedeschi & Calhoun, 1996, 2004). A growing body of empirical studies indeed reveals that many trauma survivors experience PTG after trauma besides, or in spite of psychological distress. Considering PTG as a further potential outcome of coping with trauma may broaden our clinical perspective that has long focused solely on detrimental trauma effects. In consequence, it may make sense to include PTG as one potential „positive“ outcome measure in addition to traditional measures of psychological distress within clinical intervention studies.

The first randomized controlled trials (RCTs) that investigated treatment effects on personal growth were conducted to evaluate group treatment programs for breast cancer patients (e.g., Antoni et al., 2001; Kissane et al., 2003) or spousal bereavement groups (Lieberman et al., 2003). Those studies demonstrated that growth frequently increased through treatment, whether or not treatment encouraged growth themes. Recently, also an individual internet-based cognitive-behavioral treatment program for complicated grief (Wagner, Knaevelsrud, & Maercker, 2007) evidenced a treatment effect on PTG. Interestingly, the result of a treatment effect on PTG was more unambiguous than improvements on distress and mood variables that did not show a reliable treatment effect across studies. The lack of a treatment effect on some of the distress variables may make PTG even more interesting in regard to potentially sensitive positive outcome measures for intervention programs. On the other hand, these findings may also promote the view that

some reports of PTG are illusory or result from a cultural script that favors taking up a positive attitude (Lechner & Antoni, 2004).

Growth researchers discuss the meaning and the adaptive significance of self-reported growth quite controversially. Some of them regard reports of growth to represent mainly an outcome of coping with trauma (Tedeschi & Calhoun, 2004), while others see them mainly as a coping strategy. In this view, reports of PTG reflect self-enhancing, temporary positive illusions (Taylor, 1983; Taylor & Armor, 1996), whereby the construal of benefits serves as a way to relieve distress. Many researchers think that PTG can be both, outcome and coping strategy, and speculate that growth outcomes may reflect a variety of processes (e.g. Helgeson, Reynold, & Tomich, 2006). Also the Janus face model of self-perceived posttraumatic growth (Maercker & Zoellner, 2004; Zoellner & Maercker, 2006) combines both views and considers PTG to consist of two co-existing sides, a constructive, self-transcending side, representing veridical growth, and a deceptive, illusory side. In trauma survivors who are still emotionally distressed, the perception of growth is assumed to be to a great extent illusory, serving a self-palliative function to counterbalance negative emotions. In trauma survivors who have successfully coped with the trauma and have overcome psychological distress, the perception of PTG should stem mainly from a constructive component. The debate about the significance of PTG can only be resolved empirically. Therefore, the inclusion of PTG as an additional outcome measure within intervention studies may contribute to the understanding of the phenomenon.

8.2. The Current Study

To our knowledge, this is the first randomized controlled trial (RCT) of motor vehicle accident (MVA) survivors with PTSD that investigated PTG as an additional outcome measure of a state-of-the-art cognitive-behavioral therapy (CBT) program. The main objective of the study was to examine whether a traditional CBT program for accident-related PTSD showed a therapy effect on PTG above successful treatment of PTSD severity. The intervention had not been specifically designed to enhance PTG. On the basis of other intervention studies, however, we expected an increase in posttraumatic growth for the CBT group, but not for the waiting list control (WLC) group. We further hypothesized that subdomains of PTG would be differently affected by the intervention because different subdomains of PTG seem to be differently related to the hypothesized illusory and constructive side in PTG (Zoellner, Rabe, Karl, & Maercker, 2008).

The illusory and the constructive sides in self-reported PTG were captured by the constructs of "optimism" and "openness to ideas and to feelings", with optimism representing the illusory and openness the constructive side (see Maercker & Zoellner, 2004; Zoellner et al., 2008). We hypothesized that optimism would positively predict PTG before therapy and that the openness facets would positively predict PTG after successful therapy.

We also investigated whether the extent of symptomatic improvement (PTSD) and pre-/post-treatment changes in optimism and openness were related to PTG. We hypothesized that the extent of treatment success and the increase of openness to feelings and ideas would positively predict levels of PTG at post-treatment.

8.3. Method

8.3.1. Participants and assessment

This study was part of a treatment study of accident-related PTSD that was embedded in a larger research project concerned with psychological and psychophysiological correlates of chronic PTSD at the University of Technology Dresden, Germany. Details of recruitment process are given in Maercker and colleagues (Maercker, Zoellner, Menning, Rabe, & Karl, 2006). A total of 239 persons applied and 110 completed the assessment. Of 65 participants who were eligible for the RCT, 48 attended at least one treatment session and 42 participants completed treatment. Two participants were excluded from this analysis due to incomplete data at post-treatment assessment, leaving a sample of 20 participants in each group. Severe MVAs were defined by life threat, severe injury, or severe vehicle damage. Exclusion criteria were diagnosis of psychotic or bipolar disorders, current alcohol and/or substance abuse or dependence, or any traumatic brain injury.

Diagnostic procedure. Postgraduate students in Clinical Psychology conducted all assessments after extensive training in the assessment procedures. Each diagnostic session, including an accident interview and clinical interviews, was tape-recorded and lasted 2 to 3 hours.

Injury severity. Injury severity was assessed with the Injury Severity Score (ISS), which was abstracted from medical records using the Abbreviated Injury Scale (AIS 90; Association for the Advancement of Automotive Medicine, 1990).

Trauma severity. Participants indicated levels of *subjective* accident severity on a 4-point Likert scale and level of life threat (0-100%). They were also asked to describe and indicate level of injuries of self and others, report number of inpatient and outpatient treatment days, and severity of car damage. An *objective* accident severity score was

computed as a mean of the *z*-transformed scores of injury severity (ISS), days of treatment, and extent of other people's injury severity, yielding a score range between -1 to 1.

Posttraumatic stress diagnosis. Current and lifetime diagnosis of PTSD were tested by means of the Clinician Administered PTSD Scale (CAPS; Blake et al., 1995; German version by Schnyder & Moergeli, 2002). The CAPS generates categorical diagnoses of current and lifetime PTSD as well as a total PTSD severity score. The German version of the CAPS has comparable reliability and validity to the English version with Cronbach's alphas of .88 at 5 days and .92 at 6 months after a traumatic accident (Schnyder & Moergeli, 2002). In this sample, Cronbach's coefficient alphas were .86 for pre-test and .94 for post-test assessment for the total CAPS score.

Participants were classified as PTSD if they met all three symptom clusters (B-D) according to the *DSM-IV* (APA, 1994) criteria. They were classified as subsyndromal PTSD if they met the *DSM-IV* Cluster B (reexperiencing) and either Cluster C (avoidance-numbing) or Cluster D (hyperarousal), following the definition of subsyndromal PTSD proposed by Blanchard and colleagues (Blanchard et al., 2003). All participants were required to meet Criterion F (experience of distress because of their PTSD symptoms). Subsyndromal PTSD has been shown to characterize a significant proportion of MVA survivors that is clinically meaningful and associated with significant distress (Schuetzwohl & Maercker, 1999).

Posttraumatic growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996; German version by Maercker & Langner, 2001) is a 21-item self-report measure of the degree of reported positive changes following traumatic experience. For example, an increase in the" feeling of self-reliance," the "sense of closeness with others," or the "development of new interests." Participants rated their experience of growth linked to their traumatic accident. In this sample, Cronbach's alphas were .95 (T1) and .94 (T2) for the PTGI total score and .88, .92, .84, .85, .94 (T1) and .82, .89, .70, .74, .92 (T2) for the subscales: New Possibilities, Relating to Others, Appreciation of Life, Personal Strength, and Spiritual Change.

Optimism. The study employed the German adaptation of the Life-Orientation-Test-Revised form (LOT-R; Scheier, Carver, & Bridge, 1994; German version: Glaesmer & Hoyer, 2003) to assess optimism. Examples of items are "In uncertain times I usually expect the best," and "Things never work out the way I want them to." In this sample, Cronbach's coefficient alphas were .89 (T1) and .82 (T2).

Openness to ideas and openness to feelings. Openness was assessed by the German adaptation of the Openness to Experience scale of the NEO Personality Inventory Revised (NEO-PI-R; Costa & McCrae, 1985, 1992; German version by Borkenau & Ostendorf, 1993). We were interested in two subdomains of the openness scale, the emotional and cognitive facets of openness to experience. Examples for the two subdimensions of openness are: openness to ideas ("I enjoy playing with abstract theories and ideas") and openness to feelings ("I experience a wide range of feelings and sensations"). In this sample, Cronbach's alphas were .77 (T1) and .79 (T2) for openness to ideas and .78 (T1) and .81 (T2) for openness to feelings.

Participants rated all self-report measures (PTGI, LOT-R, NEO-PI-R) on a 5-point Likert scale (0 – 4). Negatively worded items were reverse coded before scoring.

8.3.2. Participant characteristics

Data of 40 German survivors of severe MVAs with PTSD or subsyndromal PTSD who completed the treatment trial and pre- and post-assessment were analyzed (20 in the CBT and 20 in the WLC condition). Table 1 presents descriptive statistics for demographic variables and other relevant characteristics of the treatment and the control group.

Table 8.1. *Demographic, Trauma and PTSD Variables for CBT and WLC at Pre-Assessment (Previously Reported in Maercker et al., 2006*).

Characteristics	CBT	WLC	Total	Test	*p*
N	20	20	40		
Gender (Male/female)					
N	2/18	8/12	10/20	$\chi^2(1) = 4.80$	.03
Age (years)					
M (SD)	40.2 (11.0)	42.2 (10.6)	41.2 (10.7)	t (38) = -0.60	.55
Time since MVA (years)					
M (SD)	7.0 (8.6)	5.4 (3.1)	6.2 (6.4)	t (38) = -0.79	.44
Life threat					
M (SD)	58.1 (24.9)	53.1 (26.6)	55.6 (25.6)	t (38) = -0.61	.54
Subjective MVA severity					
M (SD)	3.2 (0.8)	2.9 (1.1)	3.1 (1.0)	t (38) = -0.96	.34
Objective MVA severity					
M (SD)	-0.1 (0.4)	-0.1 (0.5)	-0.1 (0.5)	t (38) = -0.07	.95
Pretreatment diagnosis					
PTSD/Subsyndromal PTSD *(N)*	11 / 9	6 / 9	17 / 23	$\chi^2(1) = 2.56$	.11
Pretreatment CAPS					
M (SD)	46.0 (18.1)	41.1 (17.2)	43.5 (17.6)	t (38) = -0.87	.39

Note. CBT = Cognitive Behavioral Treatment group, WLC = Watining List Control group, CAPS = Clinician Administered PTSD Scale; MVA = Motor Vehicle Accident.

The CBT and WLC conditions did not differ significantly in any of the variables although there were more men in the WLC than in the CBT condition (see Table 8.1). There were also no significant group differences in PTG, optimism, openness to ideas and openness to feelings at pre-test.

8.3.3.Treatment trial

A full description of the randomized, controlled treatment trial has been given elsewhere (Maercker et al., 2006). The CBT represents a German adaptation and extended version of the CBT manual by Hickling and Blanchard (1997) and has already been published (Zoellner, Karl, Maercker, Hickling, & Blanchard, 2005). It includes standard CBT techniques for the treatment of PTSD such as writing and reading aloud of the personal accident account, imaginal exposure to the worst moments of the traumatic event, step-wise in-vivo exposure with anxiety-related traffic situations, reduction of dysfunctional safety-seeking behavior, cognitive restructuring, and relaxation training. Therapists were advised not to bring up the topic of how patients regarded themselves as positively changed by the experience of trauma. If, however, patients themselves mentioned positive changes as a result of coping with the trauma, the reported benefits were appreciated and attributed to the patients' personal successes. The CBT included a range of 8-12 weekly sessions with an expected mode of 10. Six therapists were trained for the CBT manual and were supervised by one of the co-authors (A.M.) and three other licensed and experienced therapists. The CBT intervention proved to be highly effective in terms of PTSD reduction with an effect size of over d = 1.5 for pre-post-changes in the CAPS for the CBT group (for details see Maercker et al., 2006).

8.4. Results

8.4.1. Treatment outcome on posttraumatic growth

To investigate potential treatment effects on posttraumatic growth, several two-way repeated measures ANOVAs on the PTGI sum score and PTGI subscales with Time (Pre, Post) as within-subject factor and Treatment Group (CBT, WLC) as between-subject factor were conducted. We also focus on effect sizes versus statistical significance (Wilkinson & The Task Force on Statistical Inference, 1999). For interpreting partial η^2, .01 is a small effect, .06 is a medium effect, and .14 is a large effect; for *Cohen's d,* .2 is a small effect, .5 is a medium effect, and .8 is a large effect.

For overall growth and for most subdomains, analyses yielded no significant main or interaction effects (see Table 8.2).

Table 8.2. *Means, Standard Deviations, and Effect Sizes of Posttraumatic Growth for CBT and WLC at Pre- and Post-Treatment and Follow-Up for CBT.*

	PRE	POST	FU[a]	Pre-Post F value / Group x Pre-Post F value			Pre-/Post
	M *SD*	*M* *SD*	*M* *SD*	*F*(1,38)	*p*	Partial η^2	Cohen's d_{pooed}
Overall PTG							
CBT	39.10 18.68	42.6 14.37	42.88 14.85	2.13 / 0.06	.15 / .82	.053 / .001	.21
WLC	38.15 18.57	40.68 16.88	-- --				.14
New Possibilities							
CBT	7.30 5.21	9.20 3.59	9.53 3.41	3.74 / 1.27	.06 / .27	.090 / .032	.42
WLC	7.70 5.56	8.20 4.88	-- --				.10
Relating to Others							
CBT	13.85 7.38	14.00 5.62	14.59 7.05	0.24 / 0.09	.63 / .77	.006 / .002	.03
WLC	14.00 8.30	14.63 7.52	-- --				.08
Appreciation of Life							
CBT	9.99 2.20	8.35 2.80	8.06 2.19	1.75 / 0.03	.19 / 86	.044 / .001	-.26
WLC	8.75 3.13	8.25 2.15	-- --				-.19
Personal Strength							
CBT	5.80 4.25	8.35 3.00	8.00 3.18	12.90 / 3.84	.001 / .06	.253 / .092	.69
WLC	6.10 3.74	6.85 3.53	-- --				.21
Spiritual Change							
CBT	3.15 3.25	2.70 2.90	2.71 2.64	0.92 / 4.78	.35 / .04	.024 .112	-.15
WLC	1.60 2.04	2.75 2.31	-- --				.53

Note. [a]Mean scores are based on n = 16
For interpreting partial η2, .01 is a small, .06 is a effect, and .14 is a large effect.
For *d,* .2 is small, .5 is medium, and .8 is large.

There were three exceptions: For the subdomain New Possibilities, there was a marginally significant main effect of Time *[F*(1,38) = 3.74, p = .06, η^2 = .09], indicating an increase of growth in this dimension for both groups. Further, the analysis yielded a highly significant main effect [F(1,38) = 12.90, p < .001, η^2 = .25] and a marginal significant interaction effect Time x Group [F(1,38) = 3.84, p = .06, η^2 = .09] for the subdomain Personal Strength. A between-group comparison at post-test by ANCOVA controlling for pre-values revealed that the CBT condition showed a significantly greater increase of growth than the WLC in the growth dimension Personal Strength [F(1,37) = 4.95, p < .05, η^2 = .12]. There was also a significant interaction effect Time x Group [F(1,38) = 4.78, p < .05, η^2 = .11] for the subdomain Spiritual Change.

Paired t-tests on PTG and subdomains (T1 vs T2) for each condition separately, replicated the results above showing significant or marginally significant increases of growth in the CBT group for New Possibilities [t(19) = -1.94, p = .07] and Personal Strength [t(19) = -3.52, p < .01] and in the WLC group for Spiritual Change [t(19) = -2.31, p < .05]. For the 3-month follow-up, tests of stability of treatment effect on PTG in the CBT condition evidenced that the overall growth scores remained stable over this time period, with the gains of PTG in the dimension Personal Strength (paired $t_{\text{post/FU (15)}}$ = -0.21, p = .84) and New Possibilities (paired $t_{\text{post/FU (15)}}$ = -.17, p = .86) being retained.

On the level of effect sizes, the increase of overall growth from pre- to post-test was rather small for both groups, d = .21 for CBT and d = .14 for WLC (see Table 8.2). The CBT group showed, however, growth increases of medium size in New Possibilities (d = .42) and Personal Strength (d = .69). For the WLC group, there was a small increase in Personal Strength and an increase of medium size in Spiritual Change (d = .53). Interestingly, there even was a small decrease in the growth dimension Appreciation of Life for both groups (d = -.26 for CBT and d = -.19 for WLC).

8.4.2. Optimism and openness as predictors of PTG

There were no significant concurrent correlations between posttraumatic growth and optimism or the two openness facets for the whole sample at first assessment, i.e. in MVA survivors with PTSD or subsyndromal PTSD. For the CBT group after treatment, there was a marginally significant concurrent correlation between openness to feelings and PTG (r = .42, p < .10) that was accounted for by significant correlations between openness to feelings and the subdomains New Possibilities (r = .45, p < .05) and Appreciation of Life (r = .47, p < .05) (see Table 8.3).

To test whether pre-treatment optimism and openness influence PTG after successful PTSD treatment, we conducted correlations between pre-test optimism and pre-test openness facets and post-test PTG for the CBT group. Neither initial openness to feelings nor openness to ideas predicted later PTG. Unexpectedly, lower inital optimism was related with subsequent higher scores in overall PTG (r = -.47, p <.05), in Relating to Others (r = -.51, p < .05) and in Spiritual Change (r = -.38, p < .05).

Table 8.3. *Correlations Between Optimism, Openness to Feelings and Ideas at Pre-Test for Whole Sample and at Post-Test for CBT*

All (n = 40)	Overall growth (T1)	New Possibil. (T1)	Relating Others (T1)	Apprec. of Life (T1)	Personal Strength (T1)	Spiritual Change (T1)
Cross-sectional correlations at pre-test						
Optimism (T1)	-.05	.07	-.13	-.08	.10	-.17
Openness to feelings (T1)	.13	.07	.21	.04	.10	-.03
Openness to ideas (T1)	.06	-.05	.19	-.04	.03	-.01
CBT (n = 20)	Overall growth (T2)	New Possibil. (T2)	Relating Others (T2)	Apprec. of Life (T2)	Personal Strength (T2)	Spiritual Change (T2)
Cross-sectional correlations at post-test						
Optimism (T2)	-.19	-.20	-.14	-.20	.07	-.30
Openness to feelings (T2)	.42	.45*	.23	.47*	.37	.23
Openness to ideas (T2)	.28	.35	.13	.32	.28	.08
Longitudinal correlations pre-post						
Optimism (T1)	-.47*	-.37	-.51*	-.34	-.16	-.38*
Openness to feelings (T1)	-.01	-.03	-.09	.13	-.17	.24
Openness to ideas (T1)	-.21	-.14	-.28	-.07	-.15	-.12

*p< .05; ** p < .01.

8.4.3. Relations between pre-/post-treatment changes in positive health indicators and PTSD with post-treatment PTG

To estimate the influence of PTSD-related symptomatic change as well as pre-/post-treatment changes in optimism and openness facets on the experience of posttraumatic growth, residual gain scores[1] were calculated for each measure. These residual gain scores were then correlated with the mean PTGI score at post-treatment and, for control purposes, at pre-treatment. We further calculated partial correlations with post-treatment growth score controlling for pre-treatment growth score (see Table 8.4).

Looking first at correlations with post-treatment outcomes, both openness facets showed significant correlations with PTG at post-treatment, i.e. increases in openness to feelings and ideas were positively correlated with a higher growth score at post-treatment.

When controlling for pre-treatment scores, however, only the emotional facet of openness remained significantly correlated with PTG. There were also significant or marginally significant positive correlations between pre-treatment growth score and increases in openness to ideas and optimism.

Table 8.4. *Means, Standard Deviations, and Correlations of Posttraumatic Stress Disorder (PTSD) Severity, Optimism, and Openness (Residual Gain Scores) With Posttraumatic Growth (PTG) at Pre- and Post-Treatment for CBT (n = 20).*

			Correlations with		Partial Correlations[3] with
			PTG	PTG	PTG
	Mean	SD	Pre-treatment	Post-treatment	Post-treatment
Residual gains Δ					
Δ PTSD[1]	29.35	12.92	-.17	.24	.48*
Δ Optimism[2]	1.3	5.07	.40	.36	.13
Δ Openness to feelings[2]	1.75	4.66	.04	.46*	.59**
Δ Openness to ideas[2]	.70	3.67	.55*	.57*	.33

Note. Residual gain scores = pre-/post-treatment changes.
[1]Reversed scored, higher scores indicate higher reduction of the CAPS from pre- to post-treatment, i.e. greater symptomatic improvement;
[2]higher scores indicate greater increase from pre- to post-treatment;
[3]controlled for pre-treatment valued of PTG.
*p < .05; **p < .01.

Symptomatic improvement, i.e. reduction in PTSD symptoms as measured by the CAPS from pre- to post-treatment, was significantly correlated with higher growth at post-treatment only when controlling for pre-treatment growth (see Table 4).

8.4.4. PTG and PTSD

To test the direction of potential influence from one variable to the other further, we conducted regressions using one variable (e.g. PTG) at pre-test to predict the other variable (e.g. CAPS score) at post-test while controlling for its pre-test values (e.g. CAPS pre-test score). Results showed that PTSD severity at pre-test significantly predicted posttraumatic growth at post-test, $F_{change} = 6.89$, $R^2_{change} = .16$, $p < .05$, indicating that greater inital PTSD severity predicted higher growth scores at post-test. The partial correlation between initial PTSD severity and post-test growth was of medium size ($r = .54$, $p < .05$). There was no evidence for the opposite causal flow, i.e. inital PTG did not predict PTSD severity at post-test, $F_{change} = 0.33$, $R^2_{change} = .01$, $p = .57$. For control purposes, we also tested whether increases in PTG from pre- to post-treatment were related to PTSD at post-treatment. There were no significant correlations between pre-/post-treatment changes in PTG and post-

treatment PTSD (r = .14, p = .55). In line with the findings reported above, initial PTSD severity, however, positively predicted a higher increase in PTG from pre- to post-treatment (r = .47, p < .05).

8.5. Discussion

This study investigated posttraumatic growth as a potential positive outcome of a state-of-the-art RCT of a cognitive-behavioral intervention for MVA survivors with full or subsyndromal PTSD. In contrast to the hypothesis and in contrast to previous intervention studies, there was no evidence of a significant treatment effect on overall posttraumatic growth, and only a small increase was evident on the level of effect size. Previous RCTs with breast cancer patients and patients with complicated grief found significant increases in PTG throughout, whether or not the treatment was effective in terms of distress variables (e.g. Antoni et al., 2001; Kissane et al., 2003; Wagner et al., 2007). In our study, the CBT treatment proved to be highly effective in terms of reduction of PTSD symptomatology without a significant treatment effect on PTG, with two exceptions: There were growth increases in the growth subdomains New Possiblities and Personal Strength for the CBT group that were maintained at follow-up (in contrast, the WLC group showed an increase in the growth dimension Spiritual Change). Whether or not the increases in the two subdomains New Possiblities and Personal Strength for the CBT group really mirror posttraumatic growth is open to debate. They might just mirror typical effects of PTSD therapy. CBT treatment with imaginal and in vivo exposure is demanding for patients with PTSD. Therefore, the experience of going through the emotionally demanding treatment resulting in successfully overcoming the PTSD symptoms may be meaningfully linked to the experience of personal strength. Furthermore, the reduction of dysfunctional cognitions and avoidance behavior that had limited life before may foster the experience of new possibilities.

Our results question the construct of PTG as a unitary construct. The differential relations between subdomains of PTG and diagnoses status in the intervention study reflect the results of the cross-sectional examination of the larger sample of MVA survivors (Zoellner et al., 2008). Here, MVA survivors with PTSD did not differ in regard to the overall growth score from MVA survivors without PTSD. Looking at growth scores on subdomain level, however, revealed significant group differences: Motor vehicle accident survivors without PTSD evidenced higher growth scores in the subdomains Personal Strength and New Possibilities, whereas MVA survivors with PTSD showed higher growth

scores in the subdomains Appreciation of Life and Spiritual Change. If future studies replicate such diagnoses group differences, the hypothesis of a differential meaning and significance of PTG at different stages of the trauma coping process can be further strengthened.

Looking at the interrelations among PTG, optimism, and openness facets for the CBT group, we found that increases in openness to feelings and openness to ideas from pre- to post-treatment were positively related with a higher PTG at post-test. This result is in line with the Janus face model that assumes PTG after successful therapy to be predicted by a constructive factor, i.e. openness. In contrast to our exploratory hypothesis, PTG was not related to optimism before therapy. An unexpected and interesting result from the study was that lower optimism at pre-test (before therapy) predicted higher PTG at post-test (after therapy). One explanation might be that pessimists had lower expectations about therapy efficacy. Therefore, they were positively surprised about their therapy success and evaluated their therapy preformance as more outstanding than optimists who had expected to benefit anyway.

In regard to the relationship between PTSD and PTG, the results of our study imply an influence from PTSD on PTG, but not the other way around. Greater PTSD severity at pre-treatment positively predicted higher growth at post-treatment. Furthermore, symptomatic improvement, i.e. reduction in PTSD symptomatology through treatment, was positively correlated with higher growth at post-treatment when controlling for pre-treatment growth. In contrast, initial PTG or increases in PTG from pre- to post-treatment were not predictive of later PTSD severity. These results stand in contrast to reports by Linley and Joseph (2004) who claimed that empirical data suggest that PTG increases have favorable effects on PTSD reduction. Our results, in contrast, do not support the prevailing adaptive significance of PTG. They rather indicate that the severity of the *subjective* experience of trauma (trauma-related psychological distress) is predictive of the experience of growth. Results are in line with the conceptualization of growth as a mechanism of self-enhancement in the face of threat to the self.

The conclusions that can be drawn from our study must be tempered by the limitations of the study. Our sample included only traumatized individuals with MVA. Especially in the development of PTG, the trauma type may play an important role. Furthermore, culture may influence the “preparedness” to perceive PTG after trauma. Therefore, the results of our study on a German population of traumatized MVA survivors may not be generalizable to other trauma populations or populations with different cultural

backgrounds. Further, the sample size was relatively small and limits what can be stated about PTG as outcome. Especially, small samples such as ours supply less reliable estimates of population effect sizes than would larger samples.

Despite these limitations, the results of our intervention study show no significant treatment effect on overall PTG inspite of or because of a highly successful treatment effect on PTSD severity. Whether or not PTG is worthwhile to serve as an additional outcome measure for intervention studies is still a matter of further research. In our view, in the face of the existing empirical literature on PTG, it is not yet legitimate to use PTG as an outcome measure for RCTs and evaluate the effectiveness of the treatment with it. Researchers may tend to overinterpret reports of growth as favorable positive outcomes. It is still not clear yet what reports of growth mean. There is evidence that in some cases PTG mirrors veridical growth, whereas in other cases PTG mirrors a self-enhancement strategy (for a thorough review and discussion see Zoellner & Maercker, 2006). There even is recent evidence that reported PTG is linked to worse psychological adjustment in individuals with more severe breast cancer (Tomich & Helgeson, 2006). Further, there are hints that individuals might feel social pressure to report growth by the „tyranny of positive thinking“ (Lechner & Antoni, 2004). For the adequate assessment of PTG and the investigation of its particular meaning in a particular individual at a particular point of the trauma coping process, it seems that quantitative measures alone are not sufficient to capture the phenomenon. Qualitative studies and idiographic approaches may be of unique additional and heuristic value to the field (see Saakvitne, Tennen, & Affleck, 1998).

8.6. Note

1. Residual gain scores were calculated to serve as a dependent variable to indicate an increase in outcome measures from pretest to post-test. Each participant's residual gain score at each post-treatment point was the deviation of the post-treatment score from the pre-treatment score on that measure. Residual gain scores were reversed when appropriate, so that higher scores indicated greater improvement (e.g. higher reduction in CAPS).

9. CONCLUDING DISCUSSION AND FUTURE DIRECTIONS

9.1. Summary and Discussion of Results

The two preceding empirical studies, the cross-sectional comparison between motor vehicle accident (MVA) survivors with and without PTSD, as well as the randomized controlled trial (RCT) of MVA survivors with PTSD comparing a cognitive behavioral therapy program with a waiting list control group, aimed to further investigate posttraumatic growth (PTG) and its prediction by an illusory and a constructive factor. Before discussing the significance and possible conclusions of the findings, the main results shall be summarized briefly.

The cross-sectional comparison between MVA survivors without PTSD, with subsyndromal PTSD, and with full PTSD, evidenced no significant differences in the amount of overall PTG. Further analysis showed that the PTSD group had higher growth scores in the dimensions Appreciation of Life and Spiritual Change, whereas the Non-PTSD group showed a higher growth score in Personal Strength. In regard to the prediction by optimism as the illusory factor and openness to new ideas and to feelings as the constructive factor, the exploratory regression analysis revealed a general negative relation between optimism and PTG, meaning that those with lower optimism showed higher growth scores. Furthermore, there were interaction effects between PTSD and optimism and openness to new ideas. For those with low PTSD, optimism was still negatively related to PTG, whereas openness to new ideas was positively related to PTG. That is, PTG in non- or low-distressed MVA survivors was predicted by a constructive factor and was negatively related to an illusory factor. In contrast, for those with high PTSD, there was a positive relation between optimism and PTG, indicating the existence of an illusory factor in PTG. The results are to great parts in line with the Janus face model of self-perceived PTG postulating that PTG is predicted by a constructive factor and an illusory factor and that the prediction of PTG by the two factors is dependent on the level of psychological distress, here PTSD.

The result that optimism, if at all, was generally negatively related to PTG in both studies is noteworthy. This negative relation between optimism and PTG applied specifically to MVA survivors with low PTSD in the cross-sectional study (compared to MVA survivors with high PTSD) and to the successfully treated CBT group (compared to the WLC group) in the intervention study. That is, in the intervention study, lower optimism before therapy predicted higher PTG after therapy for the CBT group. The result of a negative relation between PTG and optimism in low distressed trauma survivors is, at first

glance, counterintuitive. One could propose the hypothesis that PTG might be a way of positive psychological compensation that is employed by those who lack optimism. To put it bluntly, optimists may not need the perception of PTG because they have a positive outlook on their lives and futures anyway. Naturally these ideas are speculative and need to be investigated in future research.

The main and probably most surprising result of the RCT of a cognitive behavioral program for PTSD was that there was no significant increase in overall growth after successful treatment and that the CBT and the WLC group did not differ significantly from one another at second assessment in overall growth. There were, however, a few medium-size group differences in subdomains of the PTGI. The CBT group showed increases in Personal Strength and New Possibilities, whereas the WLC group showed an increase in Spiritual Change leading to an overall similar growth score. The specific group differences correspond with the group differences between MVA survivors with and without PTSD in the cross-sectional study. It seems that non- or low-distressed trauma survivors show higher growth in more self-related domains of PTG (i.e. Personal Strength and New Possibilities), which express the experience of self-confidence, self-reliance, and manageability of future adversity. In contrast, trauma survivors who are still struggling with psychological distress tend to show higher growth perceptions in subdomains of PTG that are associated with a transpersonal dimension or a heightened awareness (i.e. Spiritual Change and Appreciation of Life) – both domains that point to dimensions beyond the self.

Further, the level of initial PTSD proved to be the best predictor of PTG after therapy. That is, higher pre-test PTSD predicted higher PTG at post-test. Interestingly, there was no evidence for the opposite causal flow: Pre-test PTG was not predictive of post-test PTSD. Altogether, the results question the widely accepted adaptive significance of PTG. In both studies, there were no significant differences in the amount of overall growth between MVA survivors with high PTSD and those with low or no PTSD. According to Tedeschi and Calhoun (2004), trauma survivors who have successfully coped with the trauma as indicated by reduced distress, should show higher and "real" growth. The hypothesis stems from the assumption that PTG is a sign of positive adaptation to trauma and the result of a successful coping process. A reduction of emotional distress is assumed to be one prerequisite for growth to emerge, although they do not assume that growth puts an end to emotional distress. Tedeschi and Calhoun (2004) concede that there might be something like illusory growth, which is the perception of growth as a coping strategy. Their model of PTG

still implies, however, that those who have really grown as the result of coping should show higher growth than those who use the perception of growth as a coping strategy.

The results of the two empirical studies presented here do not agree with this assumption. Furthermore, the results from the intervention study stand in contrast to previous findings of other intervention studies (Antoni et al., 2001; Kissane et al., 2003; Lieberman et al., 2003; Wagner, Knaevelsrud, & Maercker, 2007) that found PTG to increase from pre- to post-therapy assessment. Although Linley and Joseph (2004) claimed in their overview that empirical studies suggest that an increase in growth is related to better adjustment (PTSD reduction), this relation was not unambiguously true for the cited intervention studies. In some of the intervention studies (e.g. Antoni et al., 2001) there was a treatment effect on PTG in spite of or independent from a lacking treatment effect on distress variables. This result can easily be explained by the theory of dissonance by Lionel Festinger (1974). In order to reduce cognitive dissonance that is created by having gone through therapy with no satisfying treatment effect on emotional distress, participants of the therapy program needed a good reason for themselves why it was worth going through therapy and found a positive compensation by perceiving themselves to have grown.

Our findings of the intervention study are, however, in line with the supposition of Tedeschi and Calhoun (2004) that PTG and indices of psychological distress or emotional well-being might be separate and independent dimensions, and that experiences of PTG do not put an end to distress. If this proves to be true, the following questions inadvertently arise: If PTG is, in fact, independent from psychological adjustment, is PTG in any way clinically significant? Does PTG make any difference in the lives of trauma survivors? Or, is PTG just an interesting cognitive phenomenon that is typical after the experience of traumatic or stressful events? The issue of the adaptive significance of PTG is a central one because PTG in the absence of any improvement in psychological functioning, feelings, or behavior would be of little importance. It is too early to give any definite answers to these questions, but it seems imperative for researchers to ask these questions and try to find answers that are empirically founded.

9.2. Limitations of the Studies

The conclusions and considerations that have been drawn from the presented empirical studies must be mitigated by their limitations. In both studies, the overall growth score was relatively low compared to other studies. This might have produced a bottom effect and might have made it more difficult to detect relations between PTG and other

factors. In the intervention study, the sample size of trauma survivors with full PTSD was relatively small. More differences between trauma survivors without and with full PTSD would probably have been found with more "true" cases of PTSD. Further, the time span of a 3-months follow-up is not a very long time to detect longitudinal relations between variables. It might be the case that the effect of therapy or other factors on PTG develop over a longer period of time. This was the case in another longitudinal study in which the relation between PTG and adjustment grew stronger over time (Davis, Nolen-Hoeksema, & Larson, 1998). The main critique of the studies, however, concerns the construct validity of the hypothezised illusory and constructive factors in PTG. Although it is plausible to take the construct of optimism as representing the illusory factor and the construct of openness as the constructive factor, optimism and openness might be too distal constructs from the specific cognitive processing of the trauma to represent the two sides in self-perceived growth accordingly. There are probably better operationalizations of the two constructs that should be realized in future studies.

9.3. Future Directions

9.3.1. Assessment of the illusory side in PTG

The adaptation of methodology used in research on temporal comparisons (e.g. McFarland & Alvaro, 2000) might offer a fruitful way to assess the illusory side in the perception of PTG. In a series of lab studies, McFarland and Alvaro (2000) showed that people who have been confronted with self-threatening information tend to derogate their perceived former selves on a series of characteristics. Thus, they create the illusion that they have grown. People who have been confronted with trauma and those who have not do not rate their actual perceived selves differently, but they differ in their recalled former selves. The more severe a person rates her trauma, the more negatively biased is her recalled former self. Those studies gave evidence to the proposition that reports of growth are, at least in part, positive illusions and that threat or trauma motivates a need for self-enhancement. This methodology of assessing current and recalled former status on personal characteristics can easily be applied to the assessment of PTG. From the available empirical literature, one can hypothezise that trauma survivors with and without PTSD would not differ in their perceived current status on PTG, but that they would differ in their recalled status on PTG with the PTSD group showing a more negatively biased recall of past PTG status. In a longitudinal design, one could assess current and recalled status on the PTGI, other measures of current and recalled subjective experience related to the trauma (e.g. trauma

severity, trauma induced emotional distress) and, simultaneously, traditional clinical indices such as PTSD by clinical interviews over several assessment points. This methodology of multiple simultaneous assessment of current and recalled growth over a period of time might offer very exciting opportunities to put current as well as recalled – possibly negatively biased- perceived level of growth into relation with other measures such as indices of adjustment, PTSD, ratings of trauma severity, or cognitive coping strategies. Comparing the current perceived growth level with the recalled perceived growth level for the same assessment point would allow to reveal the illusory side in the perception of growth very clearly. It is to discover, whether or not the mechanism of derogating the past and not enhancing the present status –here, the recalled and actual perceived level of growth- is responsible for the perception of growth. This approach would allow detecting individual differences in the tendency to distort the past as well as reveal factors that influence the need for self-enhancement or illusory personal growth through this mechanism.

9.3.2. Assessment of the constructive side in PTG

For the assessment of the hypothezised constructive factor in PTG, a promising approach is to assess the concrete cognitive processing of the struggle with trauma and its impact. To this end, one could adapt the approaches by Calhoun and colleagues (Calhoun, Cann, & McMillen, 2000) as well as Bower and colleagues (Bower, Kemeny, Taylor, & Fahey, 1998) who employed self-constructed questionnaires to measure deliberate cognitive processing of a traumatic event and its impact. Both measures show, however, some overlap in the semantics with PTG measures, such as the PTGI. Therefore, the self-report measures of cognitive processing had to be revised to distinguish more clearly between process (cognitive processing) and outcome (PTG). Furthermore, such a revised measure should also distinguish more clearly between intrusive thinking and deliberate, effortful thinking about the trauma. Additionally, the content of the ruminative or cognitive process, as well as the frequency of certain cognitions need to be considered. As Treynor and colleagues (Treynor, Gonzalez, & Nolen-Hoeksema, 2003) were able to show, adaptive and maladaptive ruminative activities exist and need to be distangled from one another.

Another, more direct way of assessing a constructive (as well as potential maladaptive) way of cognitive processing would be to give participants a think-aloud task in regard to their traumatic event and the impact it has had on their lives. One could simply ask participants to think aloud about the trauma the way they usually do at home. These thought protocols could, then, be qualitatively analyzed in terms of maladaptive and adaptive forms

of cognitive processing. Another possibility is to employ an experimental design with two different instructions. One group is asked to think aloud as they usually do at home, whereas the other (intervention) group gets concrete and direct instructions that support a constructive and adaptive way of thinking about the trauma and its impact. The hypothesis is that those who have been instructed and supported to guide their thinking and cognitive processing of the traumatic experience in a constructive way should show greater PTG at a second assessment than those who have received no concrete instruction.

9.3.3. Assessment of the significance of PTG

To address the issue of PTG and adjustment while taking the experience of the current available theoretical and empirical literature on the concept of PTG into account, the following question for future research also arises: If PTG has no influence on traditional measures of psychological adjustment, are there other relevant measures of subjective experience that might be changed and improved through the experience of PTG and might make a difference in people's lives? Answers to this question would assist in enhancing the validity and pragmatic value of the PTG concept and go beyond a pure clinical relevance.

One obvious way to assess potential differences in people's lives through the experience of growth is to ask the person in what way the experience of growth manifests itself in their daily lives. If a person, for example, states that she appreciates life much more, one should try to find out what this means in concrete terms and how this is mirrored in behavioral, observable indices, or in increases in objective indices of subjective, inner experiences such as positive mood, tranquility, or calmness. One possibility is to extend the PTGI in that way that study participants should fill out the PTGI in its regular form, but are additionally asked to give a concrete example (behavioral or observable indicator) of their daily life for their perceived change for any item that they answered as positively changed.

In this context, it might also be worth considering to broaden the perspective on adjustment and go beyond the mainstream utilitarian view by Western scholars and clinicians who regard a decrease in distress and an increase in psychological well-being the desirable outcome that should be aimed at. Calhoun and Tedeschi (2006) pointed out that for some trauma survivors, the "satisfactory response to the major existential questions and to the questions about how to live one's live in the fullest way possible, may be more important than the reduction of psychological discomfort" (p. 7). From a utilitarian perspective, PTG

may not be “adaptive”, but may be related to an individual’s experience of living life in ways that are richer, fuller, and more meaningful.

In the investigation and evaluation of the significance of PTG, another aspect also has to be considered: there are researchers (e.g. Nolen-Hoeksema & Davis, 2004) who think that the sole quantitative assessment of PTG may not be appropriate to capture the phenomenon of growth and to investigate its impact. The logic of the quantitative approach is that more growth or more positive changes must be associated with better outcome. Some authors, however, claim that it is less important how many positive changes a person experiences, but whether or not she perceives any important positive shift at all. Therefore, a categorical analysis of people who have grown and those who have not might be more fruitful to investigate and detect the constructive factor in PTG and the potential adaptive significance of PTG. A combination of qualitative with quantitative research methods might be another interesting avenue for assessing PTG. For example, researchers could use the quantitative PTGI and use an interview format to assess and explore potential personal growth. It would be interesting to see how much the quantitative and qualitative measure accord with one another and which one is more related to indices of adjustment.

9.3.4. The role of positive emotions for PTG

Furthermore, the role of emotions, particularly positive emotions, has been neglected in PTG research. There is recent evidence that positive emotions were related to the experience of growth as manifested in increases in life satisfaction, optimism, and tranquility, and that they fully accounted for the relation between pre-crisis resilience and post-crisis growth (Fredrickson, Tugade, Waugh, & Larkin, 2003). It is very likely that positive emotions constitute a confounded, but not assessed third factor in many studies that accounts for the relationship between PTG and assessed other (cognitive) measures. One could argue that because cognitions and emotions are linked to one another, the assessment of cognitions (neglecting the assessment of emotions) suffice. The cognitions an individual perceives give information on the kind of emotions she is experiencing. Individuals, however, may have several competing cognitions over a situation that lay on different levels of consciousness. Therefore, assessing cognitions by self-report may mislead researchers by assessing the cognition that is most conscious, but with probably the lowest emotional impact and that does not give adequate information on the emotional state of a person. Therefore, assessing emotions along with cognitive concepts such as the perception of PTG

may give more direct information on the impact and adaptive significance of the experience of growth. It may be the case that researchers will find that some people reporting growth really experience more positive emotions and that in those cases, PTG has an adaptive function and clinical significance for the person, whereas in other cases, the perception of PTG is confined to a quite conscious, cognitive level with no deep-seated influence on well-being and impact on emotional state.

For the assessment of emotions, different methodologies are possible. A simple one is just to let people fill out the intensity of a list of emotions that they have experienced on average over a limited period of time, such as the previous month. Another, probably more precise way of assessing the impact of PTG on emotions or the relationship between emotions and PTG, is to let people fill out ratings of emotions several times a day. Another wide field of research opens up when the investigation of PTG and emotions becomes embedded in psychophysiological and lab research of brain activity (e.g. Rabe, Zoellner, Maercker, & Karl, 2006). For example, the assessment of specific patterns of brain activities of the left and right hemisphere that are linked to negative or positive emotions may support the validity of emotion assessment.

9.3.5. PTG and coping with future adversity

Another warranted research question is, whether or not a person who claims to have grown from a traumatic event would deal better with a future traumatic event. This assumption arises especially in cases in which PTG is related to "feeling stronger" or the perception "I can manage everything after having coped with this". Here again, it is a question of how "real" this self-evaluation is, or to what extent it is a positive illusion to hold up one's spirits. Janoff-Bulman (2006) postulates that one aspect of PTG is a kind of psychological preparedness to resist subsequent trauma. Naturally, the realization of such a research project is challenging because it calls for a longitudinal design with a large sample over several years. One could think of integrating this kind of research question within a large representative study that has diverse goals.

9.3.6. Cultural differences in the experience of PTG

Another field of research in the context of PTG research is the investigation of cultural differences in the experience of PTG including the social pressure to report PTG after traumatic events. One can assume that the cultural context with its social norms, cultural beliefs, and imperatives would play a great role in how a person copes with a

traumatic event. In the same realm, one can assume that the tendency to draw "strength from adversity" is, at least partly, culturally determined. There exist first traces that some people report growth, not because they really feel they have grown from the experience, but because they feel they should have grown (Lechner & Anoni, 2004). Further, an international study could show that US citizens report higher growth after a terrorist attack than European citizens (Steger, Frazier, & Zacchanini, cited in Frazier & Kaler, 2006). This difference is probably due to cultural differences in cultural attitudes and imperatives towards coping with adversity and potentially more social pressure on trauma survivors in the USA to report PTG. Therefore, it would be worth to study attitudes towards growth along with assessing self-reported growth. Even though it could be shown that social desirability does not influence reports of growth, it seems that assessing social desirability in a more specific form might be more fruitful to detect socio-cultural pressure. If future studies further support cultural differences in the amount of growth reported after trauma, it would be interesting to investigate whether these differences are totally explained by diverting cultural pressure to report growth that make people report growth even though they do not experience it, or whether the cultural context influences the coping process in that direction that trauma survivors indeed experience more growth than people in other cultural contexts. This line of research would shift the investigation from individual differences to "collective" socio-cultural differences among different ethnic groups.

9.4. Conclusions

In contrast to other well-validated constructs of "positive psychology" like optimism that clearly have a positive influence on psychological adjustment, the construct of posttraumatic growth is still less understood. It seems justified to state that PTG, at least self-reported PTG (which is usually assessed in the majority of studies), is a more complex and ambiguous phenomenon that does not have a definite and clearly adaptive significance for psychological adjustment. When taking into account the many empirical studies reviewed in the theoretical overview article, the two own empirical studies, and the many studies that have been conducted since then, it is clear that reports of PTG are positively related to psychological adjustment in some cases and are not related or even negatively related in other cases. These results together with the results of the relations of PTG with other cognitive processes, coping strategies, and cognitive concepts support the idea outlined in the Janus face model of self-perceived PTG (Maercker & Zoellner, 2004; Zoellner & Maercker, 2006) that assumes PTG to consist of a constructive and an illusory side. This

view of two flip sides of PTG is shared by other researchers who have described this idea in different terms (e.g. Lechner & Antoni, 2004; Park, 2004; Wortman, 2004).

The challenge of future research will be to differentiate the concept of posttraumatic growth and to pinpoint indicators of "veridical" growth which really makes a difference in people's lives and "illusory" growth which might help people cope with adversity. To that end, it seems necessary to break new ground in assessing PTG and to depart from the typical questionnaire methodology in clinical psychology. As outlined, some of the possibilities to enrich the questionnaire method are the assessment of daily mood or emotions, psychophysiological lab research of brain activity, assessment of behavioral indices, or the assessment of how a person who states that she has grown manages a future crisis.

10. REFERENCES

Affleck, G., & Tennen, H. (1996). Construing benefits from adversity: Adaptational significance and dispositional underpinnings. *Journal of Personality, 64*, 900-922.

Affleck G., Tennen, H., & Rowe, R. (1991). *Infants in crisis. How parents cope with newborn intensive care and its aftermath.* New York: Springer.

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.

Aldwin (1994). *Stress, coping, and development*. New York: Guilford.

Aldwin, C.M., Levenson, M.R., & Spiro III, A. (1994). Vulnerability and resilience to combat exposure: Can stress have lifelong effects? *Psychology and Aging, 9,* 34-44.

Aldwin, C.M., Sutton, K.J., & Lachman, M. (1996). The development of coping resources in adulthood. *Journal of Personality, 64,* 837-871.

Antoni, M.H., Lehman, J.M., Kilbourn, K.M., Boyers, A.E., Culver, J.L., Alferi, S.M., Yount, S.E., McGregor, B.A., Arena, P.L., Harris, S.D., Price, A.A. & Carver, C.S. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. *Health Psychology, 20,* 20-32.

Antonovsky, A. (1993). The structure and properties of the Sense of Coherence Scale. *Social Science and Medicine, 367,* 725-733.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, D.C.: Author

Armeli, S., Gunthert, K.C., & Cohen, L.H. (2001). Stressor appraisals, coping, and post-event outcomes: The dimensionality and antecedents of stress-related growth. *Journal of Social and Clinical Psychology, 20,* 366-395.

Association for the Advancement of Automotive Medicine (1990). *The Abbreviated Injury Scale.* Des Plaines, IL: Author.

Best, M., Streisand, R., Catania, L., & Kazak, A.E. (2001). Parental distress during paediatric leukaemia and posttraumatic stress symptoms (PTSS) after treatment ends. *Journal of Paediatric Psychology, 26,* 299-307.

Blake, D.D., Weathers, F.W., Nagy, L.M., Kaloupek, D.G., Charney, D.S., & Keane, T.M. (1995). *Clinician-administered PTSD scale for DSM-IV (CAPS-DX).* National Center for Posttraumatic Stress Disorder, Behavioral Science Division, Boston VAMC, Boston, MA.

Blanchard, E.B., Hickling, E.J., Devineni, T., Veazey, C.H., Galovski, T.E., Mundy, E., et al. (2003). A controlled evaluation of cognitive behavioral therapy for posttraumatic stress in motor vehicle accident survivors. *Behaviour Research and Therapy, 41,* 79-96.

Blanchard, E.B., Hickling, E.J., Taylor, A.E., Loos, W.R., & Gerardi, R.J. (1994). Psychological morbidity associated with motor vehicle accidents. *Behaviour Research and Therapy, 32,* 283-290.

Borkenau, P., & Ostendorf, F. (1993). *NEO-Persönlichkeitsinventar nach Costa und McCrae, Revidierte Fassung (NEO-PI-R).* Manual. *(NEO-Personality Inventory by Costa & McCrae, Revised Form).* Göttingen: Hogrefe.

Bower, J.E., Kemeny, M.E., Taylor, S.E., & Fahey, J.L. (1998). Cognitive processing, discovery of meaning, CD4 decline, and AIDS-related mortality among bereaved HIV-seropositive men. *Journal of Consulting and Clinical Psychology, 66*, 979-986.

Calhoun, L.G., Cann, A., Tedeschi, R.G., & McMillan, J. (2000). A correlational test of the relationship between growth, religion, and cognitive processing. *Journal of Traumatic Stress, 13*, 521-527.

Calhoun, L.G., & Tedeschi, R.G. (1998). Beyond recovery from trauma: Implications for clinical practice. *Journal of Social Issues, 54,* 357-371.

Calhoun, L.G., & Tedeschi, R.G. (1999). *Facilitating posttraumatic growth*. Mahwah, NJ: Lawrence Erlbaum.

Calhoun, L.G., & Tedeschi, R.G. (2004). The foundations of posttraumatic growth: New considerations. *Psychological Inquiry, 15,* 93-102.

Calhoun, L.G., & Tedeschi, R.G. (2006a). The foundations of posttraumatic growth: An expanded framework. In L.G. Calhoun & R.G. Tedeschi (Eds.), *Handbook of posttraumatic growth* (pp. 3-23). Mahwah, New Jersey: Lawrence Erlbaum.

Calhoun, L.G., & Tedeschi, R.G. (2006b). *Handbook of posttraumatic growth: Research and practice.* Mahwah, NJ: Erlbaum.

Caplan, G. (1964). *Principles of preventive psychiatry*. New York: Basic Books.

Christopher, M. (2004). A broader view of trauma: A biopsychosocial-evolutionary view of the role of the traumatic stress response in the emergence of pathology and/or growth. *Clinical Psychology Review, 24,* 75-98.

Cohen, L.H., Hetter, T.R., & Pane, N. (1998). Assessment of posttraumatic growth. In R.G. Tedeschi, C.L. Park, & L.G. Calhoun, *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 23-42). Mahwah, NJ: Erlbaum.

Cordova, M.J., Cunningham, L.L.C., Carlson, C.R., & Andrykowsky, M.A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology, 20*, 176-185.

Costa, P.T., & McCrae, R.R. (1985).*The NEO Personality Inventory Manual.* Odessa , FL: Psychological Assessment Resources.

Costa, P.T., & McCrae, R.R. (1992). *Revised NEO Personality Inventory (NEOPI-R) and NEO Five-Factor Inventory (NEO-FFI).* Odessa , FL: Psychological Assessment Resources.

Curbow, B., Somerfield, M.R., Baker, F., Wingard, J.R., & Legro, M.W. (1993). Personal changes, dispositional optimism, and psychological adjustment to bone marrow transplantation. *Journal of Behavioral Medicine, 5*, 423-443.

Davis, C.G., Nolen-Hoeksema, S., & Larson, J. (1998). Making sense of loss and benefiting from the experience: Two construals of meaning. *Journal of Personality and Social Psychology, 75,* 561-574.

Derogatis, C.R. (1977). SCL-90. *Administration, scoring, and procedures. Manual 1 for the R(evised) version and other instruments of the psychopathology rating scale series*. Baltimore: John Hopkins University School of Medicine.

Ehlers, A. & Steil, R. (1995). Maintenance of intrusive memories in posttraumatic stress disorder: A cognitive approach. *Behavioural and Cognitive Psychotherapy, 23*, 217-249.

Filipp, S.H. (1999). A three-stage model of coping with loss and trauma. In A. Maercker, M. Schützwohl, & Z. Solomon (Eds.), *Posttraumatic stress disorder: A lifespan developmental perspective* (pp. 43-78). Seattle, WA: Hogrefe & Huber.

Finkel, N.J. (1974). Stress and traumas: An attempt at categorization. *American Journal or Community Psychology, 2*, 265-273.

Finney, J.W., Mitchell, R.E., Cronkite, R.C:, & Moos, R.H. (1984). Methodological issues in estimating main and interactive effects: examples from coping/social support and stress field. *Journal of Health and Social Behavior, 35,* 85-98.

Frankl, V. (1961). Logotherapy and the challenge of suffering. *Review of Existential Psychology and Psychiatry, 1,* 3-7.

Frazier, P., Conlon, A., & Glaser, T. (2001). Positive and negative life changes following sexual assault. *Journal of Consulting and Clinical Psychology, 69,* 1048-1055.

Frazier, P.A., & Kaler, M.E. (2006). Assessing the validity of self-reported stress-related growth. *Journal of Consulting and Clinical Psychology, 74,* 859-869.

Fredrickson, B.L., Tugade, M.M., Waugh, C.E., & Larkin, R. (2003). What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84,* 365-376.

Glaesmer, H., & Hoyer, J. (2003). *German version of the Life-orientation test-revised version (LOT-R).* Institute of Psychology, Dresden, Germany: Unpublished manuscript.

Heider, F. (1958). *The psychology of interpersonal relations*. Oxford, England: Wiley.

Helgeson, V.S., Kerry, Rynolds, K.A., & Tomich, P.L. (2006). A Meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology, 74,* 797-816.

Hickling, E.J., & Blanchard, E.B. (1997). The private psychologist and manual-based treatments: Posttraumatic stress disorder secondary to motor vehicle accidents. *Behaviour Research and Therapy, 35,* 191-203.

Holmbeck, G.N. (1997). Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from clinical child and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology, 65,* 599-610.

Janoff-Bulman, R. (1992). *Shattered Assumptions.* New York: The Free Press.

Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L.G. Calhoun & R.G. Tedeschi, *Handbook of posttraumatic growth* (pp. 81-99). Mahwah, NJ: Lawrence Erlbaum.

Janoff-Bulman, R., & Frantz, C.M. (1997). The impact of trauma on meaning: From meaningless world to meaningful life. In M. Power & C.R. Brewin (Eds). *The transformation of meaning in psychological therapies* (pp. 91-106). New York: Wiley.

Joseph, S., Williams, R., & Yule, W. (1993). Changes in outlook following disaster: The preliminary development of a measure to assess positive and negative responses. *Journal of Traumatic Stress, 6,* 271-279.

Kelley, H.H. (1972). Attribution in social interaction. In E.E. Jones, DE. Kanouse, H.H. Kelley, R.E. Nisbet, S. Valins, & B. Weiner (Eds.), *Attribution : Perceiving the causes of behavior* (pp. 1-26). Morristown, NG: General Learning Press.

Kessler, R.C., Sonnega, A., Bromet, E., & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52,* 1048-1060.

Kierkegaard, S. (1983). *Fear and trembling.* Princeton, NJ: Princeton University Press.

King, L.A., King, D.W., Fairbank, J.A., Keane, T.M., & Adams, G.A. (1998). Resilience-recovery factors in PTSD among female and male Vietnam veterans: Hardiness, post-war social support, and additional stressful life events. *Journal of Personality and Social Psychology, 74,* 420-434.

Kissane, D.W., Bloch, S., Smith, G.C., Miach, P., Clarke, D.M., Ikin, et al. (2003). Cognitive-existential group psychotherapy for women with primary breast cancer: A randomised controlled trial. *Psycho-Oncology, 12,* 532-546.

Klauer, T., & Filipp, S.-H. (1997). Life change perception in cognitive adaptation to life-threatening illness. *European Review of Applied Psychology, 47,* 181-188.

Kobasa, S.C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology, 37*, 1-11.

Lechner, S.C., & Antoni, M.H. (2004). Posttraumatic growth and group-based interventions for persons dealing with cancer: What have we learned so far? *Psychological Inquiry, 15,* 35-41.

Lehman D.R., Davis, C.G., Delongis, A., Wortman, C.B., Bluck, S., Mandel, D.R. et al. (1993). Positive and negative life changes following bereavement and their relations to adjustment. *Journal of Social and Clinical Psychology, 12*, 90-112.

Lieberman, M.A., Golant, M., Giese-Davis, J., Winzlenberg, A., Benjamin, H., Humphreys, K., et al. (2003). Electronic support groups for breast carcinoma. A clinical trial of effectiveness. *Cancer, 97,* 920-925.

Linley, P.A., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress, 17,* 11-21.

Maercker, A. (1998). *Posttraumatische Belastungsstörungen: Psychologie der Extrem-belastungsfolgen bei Opfern politischer Gewalt.* Lengerich: Pabst.

Maercker, A. (1999, August). *Posttraumatic growth: Located between protective illusion and coping effort.* Paper presented at the annual convention of the APA, Boston, USA.

Maercker, A., & Herrle, J. (2003). Long-term effects of the Dresden Bombing: Relationships to control beliefs, religious belief, and personal growth. *Journal of Traumatic Stress, 16,* 579-587.

Maercker, A., Herrle, J., & Grimm, I. (1999). Dresdener Bombennachtsopfer: 50 Jahre danach: Eine Untersuchung patho- und salutogenetischer Variablen. (Dresden

bombing night victims 50 years later. A study of patho- and salutogenic variables.) *Zeitschrift für Gerontopsychologie & -psychiatrie, 12,* 157-167.

Maercker, A., & Langner, R. (2001). Persönliche Reifung durch Belastungen und Traumata: Validierung zweier deutschsprachiger Fragebogenversionen [Posttraumatic growth: Validation of German versions of two questionnaires]. *Diagnostica, 47,* 153-162.

Maercker, A., Michael, T., Fehm, L., Becker, E.S., & Margraf, J. (2004). Age of traumatisation as a predictor of post-traumatic stress disorder or major depression in young women. *British Journal of Psychiatry, 184,* 482-487.

Maercker, A., & Zoellner, T. (2004). The Janus face of self-perceived growth: Toward a two-component model of posttraumatic growth. *Psychological Inquiry, 15*, 41-48.

Maercker, A., Zoellner, T., Menning, H., Rabe, S., & Karl, A. (2006). Dresden PTSD treatment study: Randomized controlled trial of motor vehicle accident survivors. *BMC Psychiatry, 6,* 29-36.

Martin, L.L., & Tesser, A. (1989). Toward a motivational and structural theory of ruminative thought. In J.S. Uleman & J.A. Bargh (Eds.), *Unintended thought* (pp. 306-326). New York: Guilford.

McClelland, G.H., & Judd, C.M. (1993). Statistical difficulties in detecting interactions and moderator effects. *Psychological Bulletin, 114,* 376-390.

McFarland, C., & Alvaro, C. (2000). The impact of motivation on temporal comparisons: Coping with traumatic events by perceiving personal growth. *Journal of Personality and Social Psychology, 79,* 327-343.

McMillen, J.C., & Fisher, R.H. (1998). The Perceived Benefit Scales: Measuring perceived positive life changes after negative events. *Social Work Research, 22,* 173-187.

McMillen, C., Smith, E.M., & Fisher, R.H. (1997). Perceived benefit and mental health after three types of disaster. *Journal of Consulting and Clinical Psychology, 65,* 733-739.

McMillen, C., Zuravin, S., & Rideout; G. (1995). Perceived benefit from child sexual abuse. *Journal of Consulting and Clinical Psychology, 63,* 1037-1043.

Mohr, D.C., Dick, L.P., Russo, D., Pinn, J., Boudewyn, A.C., Likosky, W., et al. (1999). The psychosocial impact of multiple sclerosis: Exploring the patient's perspective. *Health Psychology, 18,* 376-382.

Nietzsche, F. (1955). *Beyond good and evil.* (M. Cowan, Trans.). Chicago, IL: Henry Regnery.

Nolen-Hoeksema, S., & Davis, C.G. (2004). Theoretical and methodological issues in the assessment and interpretation of posttraumatic growth. *Psychological Inquiry, 15,* 60-64.

O'Leary, V.E., Alday, C.S., & Ickovics, J.R. (1998). Models of life change and posttraumatic growth. In R.G. Tedeschi, C.L. Park, & L.G. Calhoun, *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 127-151). Mahwah, NJ: Erlbaum.

O'Leary, V.E., & Ickovics, J.R. (1995). Resilience and thriving in response to challenge: An opportunity for a paradigm shift in women's health. *Women's Health: Research on Gender, Behavior, and Policy, 1,* 121-142.

Park, C.L. (1999). The roles of meaning and growth in the recovery from posttraumatic stress disorder. In A. Maercker, M. Schützwohl, & Z. Solomon (Eds.), *Posttraumatic stress disorder: A lifespan developmental perspective* (pp. 249-264). Seattle, WA: Hogrefe & Huber.

Park, C.L. (2004). The notion of growth following stressful life experiences: Problems and prospects. *Psychological Inquiry, 15,* 69-76.

Park, C.L., Cohen, L.H., & Murch, R.L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality, 64,* 71-105.

Park, C.L., & Folkman, S. (1997). Meaning in the context of stress and coping. *Review of General Psychology, 1,* 115-144.

Powell, S., Rosner, R., Butollo, W., Tedeschi, R.G., & Calhoun, L.G. (2003). Posttraumatic growth after war: A study with former refugees and displaced people in Sarajevo. *Journal of Traumatic Stress, 59*, 71-83.

Rabe, S., Zoellner, T., Maercker, A., & Karl, A. (2006). Neural correlates of posttraumatic growth after severe motor vehicle accidents. *Journal of Consulting and Clinical Psychology, 74,* 880-886.

Richardson, G.E. (2002). The Metatheory of Resilience and Resiliency. *Journal of Clinical Psychology, 58*, 307-321.

Saakvitne, K., Tennen, H., & Affleck, G. (1998). Exploring thriving in the context of clinical trauma theory: Constructive Self Development Theory. *Journal of Social Issues, Special Issue: Thriving: Broadening the Paradigm beyond illness to health, 54*, 279-299.

Schaefer, J.A., & Moos, R.H. (1992). Life crises and personal growth. In B. N. Carpenter (Ed), *Personal coping: Theory, research, and application* (pp. 149-170). Westport, CT: Praeger.

Schaefer, J.A., & Moos, R.H. (1998). The context for posttraumatic growth: Life crises, individual and social resources, and coping. In R.G. Tedeschi, C.L. Park, & L.G. Calhoun, *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 99-126). Mahwah, NJ: Lawrence Erlbaum.

Scheier, M.F., & Carver, C.S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology, 4,* 219-247.

Scheier, M.F., Carver, C.S., & Bridge, M.W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67,* 1063-1078.

Scheier, M.F., Carver, C.S., & Bridge, M.W. (2001). Optimism, pessimism, and psychological well-being. In E.C. Chang (Ed), *Optimism & pessimism: Implications for theory, research, and practice* (pp. 189-216). Washington, DC: American Psychological Association.

Schneyder, U., & Moergeli, H. (2002). German version of Clinician-Administered PTSD Scale. *Journal of Traumatic Stress, 15,* 594-599.

Schorr, Y.H., & Roemer, L. (2002, November). *Posttraumatic meaning making: Toward a clearer definition*. Poster presented at the annual meeting of the International Society for Traumatic Stress Studies in Baltimore, Maryland, USA.

Schuetzwohl, M., & Maercker, A. (1999). Effects of varying diagnostic criteria for posttraumatic stress disorder are endorsing the concept of partial PTSD. *Journal of Traumatic Stress, 12,* 155-165.

Sears, S.R., Stanton, A.L., & Danoff-Burg, S. (2003). The yellow brick road and the emerald city: Benefit finding, positive re-appraisal coping, and posttraumatic growth in women with early-stage breast cancer. *Health Psychology, 22,* 487-487.

Snape, M.C. (1997). Reactions to a traumatic event: The good, the bad and the ugly? *Psychology, Health & Medicine, 2*, 237-242.

Taylor, S.E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist, 38,* 1161-1173.

Taylor, S.E., & Armor, D.A. (1996). Positive illusions and coping with adversity. *Journal of Personality, 64*, 873-898.

Taylor, S.E. & Brown, S.E. (1994). Positive illusions and well-being revisited: Separating fact from fiction. *Psychological Bulletin, 116,* 21-27.

Taylor, S.E., Kemeny, M.E., Reed, G.F., Bower, J.E., & Gruenewald, T.L. (2000). Psychological resources, positive illusions, and health. *American Psychologist, 55,* 99-109.

Tedeschi, R.G., & Calhoun, L.G. (1995). *Trauma and transformation: Growing in the aftermath of suffering*. Thousand Oaks, CA: SAGE Publications.

Tedeschi, R.G., & Calhoun, L.G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9*, 455-471.

Tedeschi, R.G., & Calhoun, L.G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15,* 1-18.

Tedeschi, R.G., Park, C.L., & Calhoun, L.G. (Eds.) (1998). *Posttraumatic Growth: Positive changes in the aftermath of crisis.* Mahwah, NJ: Lawrence Erlbaum.

Tennen, H., & Affleck, G. (1998). Personality and transformation in the face of adversity. In R.G. Tedeschi, C.L. Park, & L.G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 65-98). Mahwah, NJ: Erlbaum.

Tennen, H., Affleck, G., Urrows, S. Higgins, P., Mendola, (1992). Perceiving control, construing benefits, and daily processes in rheumatoid arthritis. *Canadian Journal of Behavioral Science, 24,* 186-203.

Thompson, S.C. (1991). The search for meaning following a stroke. *Basic and Applied Social Psychology, 12,* 81-96.

Tomich, P.L., & Helgeson, V.S. (2006). Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychology, 23,* 16-23.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27,* 247-259.

Wagner, B., Knaevelsrud, C., & Maercker, A. (2007). Post-traumatic growth and optimism as outcomes of an internet-based intervention for complicated grief. *Cognitive Behaviour Therapy, 36*, 156-161.

Waysman, M., Schwarzwald, J., & Solomon, Z. (2001). Hardiness: An examination of its relationship with positive and negative long term changes following trauma. *Journal of Traumatic Stress, 14,* 531-548.

Widows, M.R., Jacobsen, P.B., Booth-Jones, M., & Fields, K.K. (2005). Predictors of posttraumatic growth following bone marrow transplantation for cancer. *Health Psychology, 24,* 266-273.

Wilkinson, L., & The Task Force on Statistical Inference. (1999). Statistical methods in psychology journals: Guidelines and explanations. *American Psychologist, 54,* 594-604.

Wilson, J.P., & Keane, T.M. (Eds.). (1997). *Assessing psychological trauma and PTSD*. New York: Guilford Press.

Wortman, C.B., (2004). Posttraumatic growth: progress and problems. *Psychological Inquiry, 15,* 81-90.

Yalom, I.D., & Lieberman, M.A. (1991). Bereavement and heightened existential awareness. *Psychiatry, 54,* 334-345.

Znoj, H.J. (1999, August). *European and American perspectives on posttraumatic growth: A model of personal growth: Life challenges and transformation following loss and physical handicap*. Paper presented at the annual convention of the APA, Boston, USA.

Zöllner, T., Karl, A., Maercker, A. Hickling, & Blanchard, (2005). *Manual zu Kognitiven Verhaltenstherapie von Posttraumatischen Belastungsstörungen bei Verkehrs-unfallopfern [Manual of cognitive behavioral therapy of PTSD in MVA victims]*. Lengerich: Pabst.

Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology – A critical review and introduction of a two component model. *Clinical Psychology Review, 26,* 626-653.

Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors. Openness and optimism as predictors of its constructive or illusory sides. *Journal of Clinical Psychology, 64,* 1-19.

Journal articles

Karl, A., Rabe, S., Zöllner, T., Maercker, A., & Stopa, L. (in press). Role of posttraumatic cognitions in treatment-seeking survivors of motor vehicle accidents. *Journal of Anxiety Disorders*.

Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors: Openness and optimism as predictors of ist constructive and illusory sides. *Journal of Clinical Psychology, 64,* 1-19.

Rabe, S., Zoellner, T., Beauducel, A., Maercker, A., & Karl, A., (2008). Changes in brain electrical acitivity after cognitive behavioral therapy for posttraumatic stress disorder in patients injured in motor vehicle accidents. *Psychosomatic Medicine, 70,* 13-19.

Osen, B., & Zöllner, T. (2007). Traumafokussierte Gruppentherapie für sexuell traumatisierte Frauen *(Trauma focused group therapy for sexually traumatized women).* Zeitschrift für Psychiatrie, *Psychologie und Psychotherapie, 55*, 111-122.

Maercker, A., Zoellner, T., Menning, H., Rabe, S., & Karl, A.(2006). Dresden PTSD treatment study: Randomized controlled trial of motor vehicle accident survivors. *BMC Psychiatry, 6,* 29-36.

Rabe, S., Beauducel, B., Zöllner, T., Maercker, A., & Karl, A. (2006). Regional brain electrical activity in posttraumatic stress disorder after motor vehicle addicents. *Journal of Abnormal Psychology, 115,* 687-698.

Rabe, S., Zöllner, T., Maercker, A., & Karl, A. (2006). Nerual correlates of posttraumatic growth after severe motor vehicle accidents. *Journal of Consulting and Clinical Psychology*, *74*, 880-886.

Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology - a critical review and introduction of a two-component model. *Clinical Psychology Review, 26*, 626-653.

Maercker, A. & Zoellner, T. (2004). The Janus Face of self-perceived growth: Towards a two component model of posttraumatic growth. *Psychological Inquiry*, *15,* 41-48.

Book (Therapy Manual)

Zöllner, T., Karl, A., Rabe, S. & Maercker, A. (2003). Ein kognitiv-behaviorales Behandlungsprogramm posttraumatischer Belastungsstörung nach schweren Verkehrsunfällen: Erste Ergebnisse aus einer laufenden Studie *(A cognitive-behavioral treatment program for posttraumatic stress disorder after severe motor vehicle accidents).* [Abstract] *Verhaltenstherapie, 13 (suppl 1), 47-48.*

Book chapters

Zöllner, T., Karl, A., & Maercker, A., Hickling, E. & Blanchard, E., (2005). *Manual zur Kognitiven Verhaltenstherapie von posttraumatischen Belastungsstörungen bei Verkehrsunfallopfern. (Treatment manual of a cognitive-behavioral therapy program for posttraumatic stress disorder in motor vehicle accident survivors).* Lengerich: Pabst-Verlag.

Zöllner, T., Calhoun, L.G., & Tedeschi, R.G. (2006). Trauma und persönliches Wachstum. In A. Maercker & R. Rosner (Hrsg.), *Psychotherapie der posttraumatischen Belastungsstörungen, S. 36 – 45.* Stuttgart: Thieme.

Zöllner, T. & Maercker, A (2006). Posttraumatic growth and psychotherapy. In L. Calhoun & R. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice, pp. 334-354*. Mahwah, NJ: Erlbaum.

Zöllner, T. & Maercker, A. (2005). Psychotraumatologie – Grundlagen und Anwendungen in medizinischen Disziplinen. In F. Balck (Hrsg.), *Forschungs- und Anwendungsgebiete der Medizinischen Psychologie*. Berlin: Springer.

Maercker, A. & Zöllner, T., Boos, A. (2005). Behandlung von posttraumatischen Belastungsstörungen nach Typ-I-Traumen. In P. Neudeck, & H-U. Wittchen, *Konfrontationsbehandlung bei psychischen Störungen – Theorie und Praxis, S. 335-352.* Göttingen: Hogrefe.

Maercker, A. & Zöllner, T. (2002). Life-Review-Therapie als spezifische Form der Behandlung Posttraumatischer Belastungsstörung im Alter *(Life-review therapy as a specific way of treating posttraumatic stress disorder in the elderly). Verhaltenstherapie & Verhaltensmedizin, 23, 213-225.*